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Editorial.

THE ECONOMICS OF VETERINARY TEACHING.

AT a time of year when the Chancellor of the Exchequer produces his Budget schemes, and the whole nation is, for the moment at least, deeply intent on questions of economy, it may not be out of place to bring before the veterinary public a financial statement which, though somewhat vague and general, has yet a deep significance for all and an acute and painful interest for many. We make no apology for bringing before our readers this financial statement, which is the outcome and essence of many years of difficult study. It will probably startle some of our readers and lead them to deeper veins of thought than those to which they have been hitherto accustomed in the region of economics, but that will be, we trust, a healthy intellectual discipline. Should this statement attract the notice of powerful and influential men, we trust it will show them the difficulties under which veterinary teachers carry on their work, and the possibilities that exist of a break-down in the whole present scheme of teaching. Such men at least know quite well that mere philanthropic zeal, whilst it is necessary for the establishment of an institution which has the advance of scientific knowledge and the promotion of social welfare for its chief aim, is quite insufficient in itself for the ultimate success of the institution. Business is business, says the merchant, and he is quite right; in other words, where there are economic questions they must be treated with a due regard to economic laws.

Let us suppose that a veterinary school has 100 students in attendance, each of whom pays, on an average, £14:14s. per annum. We have then a gross revenue of £1470 wherewith to start the year. The following may be taken as a fair statement of expenditure :—

Rent of buildings,	£200 0 0
Rates, taxes, coal, and gas,	50 0 0
Prospectuses, advertising, stationery, and postage,	150 0 0
Attendants and cleaning,	50 0 0
Secretarial work,	25 0 0
Maintenance of museum and laboratories,	50 0 0
	£525 0 0

Taking £525 as, so to speak, an irreducible minimum, and deducting that sum from £1470, we find ourselves with a nett

balance of £945 for distribution amongst the teachers. Let us distribute it in the following way:—

Principal's honorarium,	£100	0	0
Professors.			
Medicine and surgery,	125	0	0
Anatomy,	125	0	0
Physiology and histology,	100	0	0
Chemistry,	90	0	0
Pathology,	90	0	0
Hygiene,	50	0	0
Stable management and horse-shoeing,	50	0	0
Botany and biology,	50	0	0
Helminthology,	40	0	0
Physics,	40	0	0
Materia medica,	55	0	0
Meat inspection,	30	0	0
	£945	0	0

From this it will be seen that there are no comfortable and otiose places to be found in a Veterinary College, and men in search of wealth and ease must go elsewhere. Even a pluralist would not grow fat. If we combine botany and materia medica, for example, we get only a salary of 100 guineas. Hygiene and stable management together yield only £100. Even such a combination as physiology and helminthology would produce only £140. But a much more difficult problem is the payment of the Principal. Let him teach medicine and surgery as well as supervise the whole college, and you get only a ridiculous £225, and what man of the necessary abilities and character will look at such a figure? Of course it might be argued that if we concentrated the teaching of veterinary students we should double or even treble the hypothetical income which we have taken as the basis of our calculation, and that this would do much more than double or treble the nett income available for payment of teachers. Because the buildings which accommodate 100 students could easily take in a good many more; an extra room or two or a new wing added might render the original building capable of holding comfortably twice that number, whilst the charge for cleaning and lighting need not be very materially increased. The cost of printing again consists chiefly in the setting of the type, therefore additional copies of a prospectus, for instance, might not form a heavy item, and so with the museum and laboratories. But even in such happy circumstances your nett income is quite inadequate to attract first-rate men. Of course there will always be enthusiasts in the country—men who are born teachers, and must find an outlet for these powers at whatever sacrifice to themselves. There will be unselfish men, easy-going men, and martyrs to science, who will take the posts and do credit to them, but is it right to take advantage of our neighbours' zeal or good nature? Are these men not apt to experience a revulsion of feeling when they discover—and the discovery is likely to force itself on them sooner or later—that whilst they fancied they were acting as heroes and

martyrs they have been used very much as dupes and victims? Anyhow it is not business to act thus, and, as we have already said, economic questions must be treated on strictly economic principles, otherwise disaster overtakes us before we go very far. Other arguments may be used, as, for instance, that the hours of attendance at a Veterinary College are not long, and that the teachers have ample time to increase their incomes by doing extramural or private work; further, they have to work only five days a week, and they enjoy long summer holidays, as well as occasional rests. To this we answer that a couple of hours' work at a college means a good many hours of preparation, if the teacher is conscientious and wishes to keep abreast of the times in order to do justice to his pupils; secondly, many years of study, implying great outlay of money, are required to fit a man for such posts, so that interest on capital employed forms an important factor in his calculations; thirdly, extra work of a congenial sort cannot always be obtained; lastly, a man cannot work at such arduous tasks for ever, the strain being so great and the tax upon energy so heavy that either the man must retire comparatively early or face death when he ought to be enjoying the repose that makes the evening of life tolerable. If there be others who say that young men will be glad to get our veterinary posts as a stepping-stone to something better and higher, we answer that these posts ought in themselves and from the merely financial point of view, without private subsidy from Principals, as at present, to be made attractive to the best men; that the education of the country is not so carefully graduated that even able young men are sure of a career suited to their merits, and that therefore we should be careful how we induce young men to enter upon a path that leads nowhither. We must be thankful for youthful vigour and generosity as forming the nation's fund of energy; we must use it wherever possible, but not misuse or misdirect it.

The great difficulty in the case, as it seems to us, is the question of private (or public) practice of veterinary medicine and surgery by the Principal and some of the Professors. It is clear that no school of medicine can be complete without abundant opportunity of clinical teaching. Indeed, the success—one might say the very existence—of the Scottish schools has been due to the extensive practice of their chiefs. Those who remember that the late Professor Dick began his college with one solitary student will acknowledge this to be the simple truth. Dick was an extraordinary illustration of the power of a vigorous personality, imbued with high and noble ambition, in overcoming obstacles. He was impelled by no vulgar wish to advertise or glorify himself or heap together wealth of the baser kind; had this been the case, he would have attained his object by simply extending his practice as a consultant till he had hopelessly out-distanced his competitors; but he was dominated by the patriotic desire to found a Scottish school of veterinary surgeons, which should carry the blessings of enlightened treatment of disease in the lower animals to all parts

of the world. He succeeded admirably, as did his successors, and he gained much honour and some wealth from the world as well as the deep gratitude and admiration of his students, but all this was due to his fixity of purpose and purity of motive; it came along with the attainment of his object,—it was not that object itself. Whilst discussing this point, one might say that the Principals of the Scottish Colleges have done infinitely more for these colleges by their skilful practice of their art and by their mere personality than the colleges have done for them. It is therefore a hard case that these men should have been compelled to make good serious financial deficiencies out of their own pocket. Theirs was the task and the risk of building or renting schools and engaging teachers in the hope that students would come to their support with the necessary fees; theirs was the worry and anxiety of trotting students round to see important cases in their clients' stables, or of coaxing clients to send animals to town for the purpose of undergoing operations when these operations could have been performed much more expeditiously and with more pecuniary gain to the surgeon in the country places. In any great scheme formed by a responsible Minister for the establishment of a Central Veterinary School in Scotland—that part of the country which has done so much for veterinary science and veterinary medicine, and which therefore deserves so well of the Government—the question of clinical practice and its attendant remuneration must be kept steadily in view. Either the Principal and one or two of the Professors must be allowed to cultivate a private practice, in order to provide them with decent incomes as well as obtain a sufficiency of clinical teaching for the students, or the Government must provide a veterinary hospital as an appendage to the college, to which hospital the inhabitants of the town in which the college is situated shall be invited to send their sick animals for treatment on payment of moderate fees. These fees would form a fund for the payment of the professors, whose incomes might be made to depend on the success of the hospital from the financial point of view. Everything must be done to foster a lively interest in the development of veterinary medicine and surgery and therapeutics in the minds of both teachers and pupils, and perhaps an honest appeal to human nature, such as we have indicated, might prove a great incentive.

In pleading for a Scottish College we are not, we trust, actuated by selfish or sordid motives. We approve of healthy rivalry as the best means of keeping an edge on our intellectual appetites. Our own rivalry is perfectly healthy and successful, as witness 100 per cent. of passes in the New Veterinary College at the final examination in May last, and the gaining of the first, second, and fourth Fitzwygram prizes. Only, to use Sydney Smith's famous phrase, "We cultivate the Muses on a little oat-meal," and we have a natural craving for a more substantial diet. We think the *Spectator* was quite right when it said in a recent issue, "All monopolies tend to ossification."

Original Papers.

MILITARY HORSES; AND HOW TO BREED THEM.

BY DR. DUNCAN HUTCHEON, C.V.S., ETC.

THE South African Campaign has given rise to a great deal of discussion respecting the type or breed of horses best adapted for military purposes, more particularly the stamp of animal most suitable for cavalry and mounted infantry.

Sir Walter Gilbey, in his pamphlet on "Small Horses in Warfare," strongly advocates the breeding of small compact animals, between 13·2 and 14·2 hands high, these, he says, being the stamp on which most reliance can be placed for hard and continuous work on scanty and innutritious food. Be that as it may, every horseman will agree with his further state ment, "that increased height in the horse does not necessarily involve increased strength in all directions, as greater weight-carrying power, and more endurance." But he is somewhat reluctantly constrained to admit "that a good big horse is better than a good little one." Hence the speed, stamina, and endurance of a horse, be he big or little, resolves itself into a matter of breeding, form, and constitution.

CAPE HORSES.

In his reference to the Cape Horse, Sir Walter says: "That the universal opinion of residents in South Africa is against the introduction of imported horses for general work, inasmuch as they cannot withstand the climate, bad living, hard roads, and rough usage, which make up the conditions of a horse's life in the Colony."

This statement is only partially correct, for, like the other, it depends entirely on the type or breed of animal that is imported. But even admitting that the large majority of English horses imported into this Colony during the last three decades are not so well adapted for the general work of the country, outside of the principal towns, as the native-bred horse, that fact does not justify the statement, made on the authority of Mr. Rhodes, "that no infusion of English blood would enhance the powers of the small Colonial bred horse to perform the work required of him under local conditions; that although thoroughbred blood would improve him in height and speed, these advantages would be obtained at the cost of such indispensable qualities as endurance and ability to thrive on poor and scanty fare." Let us examine how this statement agrees with the history of the foundation and development of the Cape Horse. The foundation stock of the Cape Horse was of Eastern origin, and consisted mainly of Barbs, and Persian or Gulf Arabs, imported by the Dutch East India Company. By 1688—that is twenty years after the settlement—the horses had increased in number to a satisfactory extent, but had deteriorated very much in character and appearance. In order, therefore, to improve this breed, the Company imported a number of Persian Arabs, and subsequently passed an Act prohibiting any one from using a horse under three years of age.

In 1792 eight stud horses were imported from England. These are believed to have been of the early English roadster breed. In the same year five stud horses arrived from Boston, and the following year a number of horses and mares were brought from the New England States; these are

described as of Spanish or Eastern blood. In addition to these, in March 1807, during the Peninsular War, two French vessels were captured at the Cape, containing some Spanish horses *en route* to Buenos Ayres for breeding purposes. It is said that from these were obtained the blue and red roans which were considered by the Colonists as so valuable for their great power of endurance. Such, then, is the origin of the Cape Horse, and his character at the date of the English occupation, and for some time after, is represented as that of a strong, hardy animal, deficient in size, substance, and symmetry, but possessed of great power of endurance comparative to his size.

It was in 1813, however, that the dawn of a new era in horse-breeding commenced at the Cape. In that year Lord Charles Somerset was appointed Governor of the Colony, and soon after his arrival he directed his attention to the improvement of the Cape horse by means of the English thoroughbred, and during his term of office he imported a considerable number of first-class thoroughbreds, both stallions and mares. During the three following decades, first-class thoroughbreds continued to be imported by the leading horse-breeders of the Western Province, and the male progeny of these were distributed all over the Colony as stud horses. It was after these importations had impressed their character and qualities on the native-bred stock—from 1840 to 1860—that the Cape horse reached the highest stage of perfection which it has ever attained. It was during the latter part of this period that large consignments of horses were shipped to India, which earned for the Cape horse such a high reputation with the Indian authorities. One old Indian officer in writing of these horses said: "For an all-round horse, capable of standing hot and cold weathers in the open, and keeping his condition through, it commend me to the stamp of horse that was imported from the Cape during the Indian Mutiny." Colonel Apperley, writing of the Cape horse in 1859, remarks: "I have a very high opinion of the present Cape horses, particularly with reference to their fitness for the ranks of the Indian Army. The only complaint is their want of size, caused principally by starving the mares and foals." Compare this description with that of Veterinary-Major Nunn, who, in his report to the War Office in 1887, describes the Cape horse as "small and stunted in growth, deficient in bone, pinned in at the elbows, good shoulders and forehand, narrow chest, very badly coupled and ribbed up, with bad drooping quarters, badly developed muscles of the croup and thighs, split up behind with crooked hind legs, and hocks being very far back. In fact, the South African horse is, although small, good before but bad behind the saddle."

Now what were the causes of this deterioration in the character and quality of the Cape horse during the three decades following 1860? The first and principal cause undoubtedly was the wretched character of the large proportion of the thoroughbred stallions that were imported during this period. The marked improvement in the breed of horses which was observed to follow when the Cape mares were crossed with the well-selected thoroughbreds which were imported during the previous decades, induced the farmers to use thoroughbred stallions largely, irrespective of their character or suitability, to mate with their mares, so long as they were animals possessed of pretty heads, fine necks, and a showy appearance, and their names could be traced in the stud-book. Speculators who gauged the weakness of the Cape horse-breeders for such animals, went to

the market, and purchased the sweepings of Tattersall's for a song, and sold them to the farmers here at exhorbitant profits. Mr. Graham Cloete, Secretary of the S.A. Turf Club, wrote in 1892,—"that over 500 English thoroughbreds had been imported into South Africa," and added,—"I do not think that it is an exaggeration to state that not one-half of these importations were horses likely to benefit the horse stock of the country, while the remainder had exactly the opposite effect." Is it any wonder, then, that the English thoroughbred has been condemned as a sire suitable for improving the Cape horse, whereas the only improvement which has ever been effected in the breed has been by the introduction of the better class of thoroughbreds, and their proper mating with well-selected Cape mares. But I will revert to this subject later on.

The other cause of the deterioration of the Cape horse which has taken place during the last three decades, has been an ever progressing deficiency of food supply for the brood mares and the young growing stock. At the commencement of the period referred to more profitable pastoral pursuits began to be developed. Merino sheep-farming was rapidly extending over the whole Colony, and Angora goat-farming was likewise fast becoming an established industry, and shortly afterwards the taming and breeding of ostriches developed into a prosperous pursuit. As a result, horse-breeding was neglected except by a few of the old-established breeders, and even with them the pasture formerly reserved for the mares and foals was given over to better paying varieties of stock.

But how do these facts square with the opinion of Sir Walter Gilbey and others, who assert that artificial feeding favours delicacy of constitution, and recommend that to develop, fix, and maintain a breed of light cavalry and mounted infantry horses we must not only select pony mares "which have been accustomed to live on grass in the open air, exposed to all weathers, year in and year out," but we must treat their progeny in a similar manner in order to preserve these qualities; and further assert that "endurance, weight-carrying power, and speed maintained over long distances, are found at their best in the horse which has been reared under natural conditions, and whose stature has not been increased by selection, in-breeding, and by artificial conditions of life!" The question arises, what is meant by "artificial conditions of life?" The highest art consists in the closest imitation of Nature, and the whole art of breeding, selecting, and feeding animals for a definite object or purpose consists in closely copying Nature's most successful methods in that particular direction, and supplementing her efforts where they are likely to fail.

It may be quite true that, under the trying conditions in which the hardy races of ponies are bred and reared in all parts of the world, "Nature erects her own standard for measuring the constitutional power of her creatures, and the individuals who no longer come up to this standard perish prematurely." But surely no sane person would at the beginning of the twentieth century recommend a return to natural selection in the formation and development of a superior race of light cavalry and mounted infantry horses; or maintain that the horses so produced would be superior in speed, stamina, and endurance to those bred and reared under more favourable conditions, where their size, symmetry, speed, and endurance could be developed and maintained by careful selection, suitable feeding and exercise, and the application of the necessary trials or tests.

Nature, by the application of that inexorable law, the survival of the

fittest, has developed these respective breeds of ponies, modified their size, and endowed them with a constitution and power of endurance capable of withstanding the hardships and scanty fare to which they are subjected. But the same qualities can be developed and maintained in a larger breed of horses, and at much less sacrifice, by suitable treatment and an increased supply of food. It will not be contended surely that the best way to develop a sound and hardy constitution in a horse is to half starve him as a colt. Science and experience unite in teaching that unless a colt is properly fed and nourished when young, it will never attain its full development either in constitution, symmetry, or quality. Even the digestive organs, upon which every other character and quality more or less depends, may be ruined by being continuously distended with bulky innutritious food. I am well aware that good legs and feet cannot be properly developed in colts and fillies unless they are allowed freedom to take plenty of exercise, and it is a well-recognised fact that the horses and ponies which have to undergo the continuous exercise of climbing mountains, such as there are in Basutoland and other highland countries, the functional power of the heart and lungs becomes greatly increased, and such animals are correspondingly more efficient in a rough campaign. But it is surely possible to make arrangements to provide an appropriate artificial substitute for developing the wind and limbs of young stock.

But leaving theory and argument aside, let us inquire how horses such as are now required for military purposes have been bred. A strong opinion prevails amongst a great many Colonists that the Arab is the most suitable stallion for the production of such a breed. As some justification for entertaining such an opinion, it will be readily conceded that the strength and power of endurance so characteristic of the Cape horse is largely due to his Eastern origin, although, as already shown, it was the English thoroughbred which raised him to his highest point of excellence. Further, it is to its Arab foundation that the English thoroughbred owes its origin and distinction as the finest race of horses in the world. But the success of the Arab in forming the English thoroughbred has been largely due to the climate, abundance of good food, careful selection of the best animals to propagate the race, and to the fact that at the time of the introduction of the Arab into England the English mares with which he was mated were superior to any to be found elsewhere; and, last but not least, the severe test to which the thoroughbred is continually submitted in order to gain the winning-post on the race-course. The success of the Arab in forming the English thoroughbred is quite exceptional. In no other European country have the standard and quality of the modern breeds of racers, hunters, hacks, or carriage horses been raised by the Arab, although ample opportuaity has been given them. The present improvement of these breeds of horses throughout Europe has been effected mainly by a large infusion of English thoroughbred blood. As Lehndorff says: "A cardinal point which continually maintains and regenerates the thoroughbred as a source of power and soundness, and places it with regard to certainty of propagation far above all other breeds of the equine race, is the circumstance that the thoroughbred is tried before it is sent to the stud; whereas of the half-bred, such individuals only as are unfit for breeding purposes are put to the test." "What," he adds, "would become of the usefulness of our half-breds, what of our cavalry, without a continuance of crosses with such stallions of pure blood, bred for stoutness, and

chosen on account of their proper excellent qualities, so as to constantly renew the necessary steel in the blood."

"It is the test at the winning-post that gives the English thoroughbred horse a value for breeding purposes unequalled, and looked for in vain, in any other species of animal in creation," and that this is no fancy picture is clearly shown by the fact that the English thoroughbred was the progenitor of the only two breeds of horses which come nearest to the standard of horse which the advocates of army reform are at present anxious to obtain, viz., the early English Hackney, and the American Trotter. It will be of interest, therefore, to trace the origin and breeding of these two types of horses. The history of the early English trotting horse commences with "Old Shales." This horse was foaled in 1755, his sire was "Blaze," by "Flying Childers"; his dam a strong common English mare. He was the first noteworthy trotting horse of which there is any distinct record. It is a curious fact that "Blaze" is not of pure Eastern or Arab descent. Although entered in the stud-book, he inherits a large proportion of English blood through his dam, the "Confederate" filly. It is quite possible, therefore, and very probable, that "Blaze" inherited a trotting tendency through his dam. It is rendered all the more probable, says Euren, from the fact that in the seventh generation from "Blaze" on each side, the re-union of the blood in Rysdyk's "Hambletonian," the sire of so many fast American trotters, should have proved to be of the most impressive character.

Further, that celebrated horse "Mambrino," the sire of "Messenger," the father of American trotters, inherited an additional strain of English blood, as will be seen by the following pedigree. "Mambrino" was got by "Engineer," a son of "Sampson," by "Blaze." Lawrence, as quoted by Euren, positively asserts that "Sampson's" dam was not a thoroughbred mare, but a good hunting mare about three parts bred, and his appearance indicated that he had some common blood in his veins. He is described as the strongest horse that ever ran, and Lawrence believes that at twenty, and perhaps fifteen stone, "Sampson" would have beaten over the course both "Flying Childers" and "Eclipse," and have undoubtedly double distanced "Bonny Black." It is recorded of "Mambrino"—the grandson of "Sampson"—that he could trot fourteen miles an hour, and showed excellent trotting form.

Writing of "Messenger," the founder of the two famous strains, "Mambrino Chief" and "Hambletonian," the taproots of the American trotting Stud-Book, Mr. Leslie Macleod says:—"As to what degree of action 'Messenger' possessed we have no evidence, but this much is certain, that he left progeny noted for their speed and endurance, and when in his descendants this road gait was developed and intensified by use, and as they were mated with a view to producing progeny superior in this special qualification to themselves, each generation naturally reached a higher plane of excellence than its predecessors."

"It has to be noted, therefore, that in the formation of the American trotter 'Messenger' and his immediate descendants were mated with the common stock of the country, which consisted probably of a certain amount of English blood, with possibly a certain mixture of the original Indian horse, and of the mustang from Mexico with its Spanish origin."—(Marlborough.) In like manner, the descendants of "Old Shales"—who was by "Blaze"—were mated with good English mares, chosen for their trotting

form and enduring qualities. The trotting horses of England and America were formed, therefore, by breeding a certain trotting strain of English thoroughbred blood on selected trotting mares of the respective countries, and the breeds were developed and maintained by selection. But while the American trotter has continued to improve both in speed and endurance, owing to the fact that all American trotting stallions require to have their speed and endurance tested on the racing track before their names are admitted on the register, the English registered hackney of the present day is not required to undergo any such test of his qualifications to be placed in the Stud-Book. The majority of them are allowed to lead a life of sluggish idleness from the day they are foaled to the day of their death, generation after generation; hence the great deterioration which has taken place in the speed and endurance of the modern hackney, and the loss of his impressiveness as a sire for begetting first-class riding and driving horses possessing these qualities. There cannot be any doubt, however, that the early English trotter or hackney was an admirable horse for general purposes; in fact, he possessed all the qualities of a perfect hack. He was a very compact, comparatively small horse, from 14·2 to 15 hands, very active and docile, and capable of maintaining a high rate of speed for long distances, as the following records of some of their performances will show:—

"Marshland Shales" trotted 17 miles in 58 minutes, carrying 12 stone. A granddaughter of "Old Shales" trotted 15 miles within the hour, carrying 15 stone; while "Old Driver," her sire, trotted 17 miles within the hour.

Wroot's "Pretender" trotted 16 miles in one hour, carrying 16 stone; and "Phenomena," in July 1800, 17 miles in 56 minutes, and in the same month repeated the performance in 53 minutes. Her sire, "Othello" trotted 18 miles within the hour.

Mr. Dixon's mare "Nonpareil" trotted 100 miles in 9 hours 57 minutes, and after resting an hour walked home 7 miles to her stable.

For further records of similar trotting performances see Mr. Euren's historical introduction to the Hackney Stud-Book. It was the rapid construction of railways that exercised the principal influence in causing a falling off in the breeding of the old style of hackney. Euren says:—"Before the advent of the iron horse, it was the practice of farmers going to market to meet at cross roads, or at roadside inns, thence to travel a goodly company to market, returning at night in a similar fashion, it being then no unusual thing thus to ride fifty and sixty miles a day." But these long journeys, so common in the early days of the hackney, are not now required, and no test of the speed and endurance of the breed has been substituted for it; hence the purity of the breed only is recorded, but there is no definite arrangement made to test its quality.

As a natural consequence, while the modern hackney has been increased in size, and improved in symmetry, style, and fancy action, he has deteriorated in the qualities of speed, courage, and endurance, which are more essential for military purposes. It was the constant journeying on the hard roads, which he did so cleverly, admitting of no rival, that developed in the hackney that active nervous temperament, hard muscular conformation, and extraordinary powers of endurance which characterised the breed, and these qualities can be re-formed and maintained only by the same or similar treatment; the foundation is there all right. This is clearly shown by the fact that it is the test on the trotting track that has brought the American light harness horse to a point of excellence unrivalled by any other breed.

"His gradual gain in average speed has been from one mile in 2 minutes 42 seconds in 1820-1830, to a mile in 2 minutes 11 seconds in 1887."—(Leslie Macleod).

My object in referring to all this is to show how good horses have been bred, in order to indicate how they may again be bred.

And if I have interpreted the matter correctly, the thoroughbred should be largely used as the foundation stock, and mated with the mares native to the country, chosen because they possess as near an approach to the qualities desired as it is possible to obtain; and if the substance, free action, and endurance can be secured in the thoroughbred, I would be strongly in favour of repeating his use as a sire until the breed became fixed; but the advantage or disadvantage of this will largely depend upon the character and quality of the mares which form the foundation stock. In any case, however, the sire and dam should be chosen, not so much on account of their breed or pedigree, but because their character, conformation, and performance fulfil the requirements aimed at in the breed to be created.[1]

With respect to the advice of Sir Walter Gilbey and others, that in rearing the half-bred progeny of the foundation stock "they should be allowed to lead a free and natural life, and exist on the natural herbage of the country, in order to keep them small in size, and hardy and enduring in constitution, I quite agree that the young stock should have plenty of room to roam or gallop about, in order to develop their wind and limbs, and that they should also be trained and accustomed to feed on the natural vegetation of the country, to be able to take full advantage of it when it becomes necessary; but I do not see any advantage in limiting them to the natural vegetation alone, when it becomes deficient either in quantity or in quality. The desired size, symmetry, and quality of the breed can be maintained by selection, and I have yet to learn that an abundance of plain wholesome food renders either a horse, or a man, less hardy and enduring when the time of stress arises; all experience teaches the very opposite.

Further, I maintain that all the characters of speed, strength, and endurance can be as easily bred into an animal of 15 hands as into one of 14, while the former is much more valuable aud serviceable for general purposes than the latter, and will bring in a better return to his breeder. This latter is the crux of the whole question. A horse-breeder, who has the means and opportunities, will breed the horse that pays him best, and amongst light horses first-class riding and driving horses will always command the highest prices. There will always be misfits, even in the best managed studs, which have to be sold for military or similar purposes at a lower figure. But although these latter may not possess the size, fine symmetry, and nice quality of their more fashionably formed relations, there is no reason why they should not prove equal to them in speed, strength, and endurance, the qualities required, if they have been bred on the same lines and reared in the same manner.

A successful breeder of any class of stock, and more especially of horse stock, must have present in his mind a clear idea of the type of animal which he wishes to breed, and should possess a thorough knowledge of the

[1] It must be clearly understood that, in advocating the breeding of first-class riding and driving horses that should possess all the qualities required to fit them for Cavalry and Mounted Infantry, on the lines above described, I do not wish to detract from the value and importance of all the modern breeds of horses, both heavy and light, which have their legitimate use in private and commercial life, as well as for agricultural purposes.

means by which alone science and experience shows that such a type can be produced. The next consideration is to place such stock under the most favourable conditions for their growth and development, the most important consideration being a sufficiency of suitable nourishing food, and plenty of room for healthy exercise.

Having selected your foundation stock, chosen because they possess the characters and qualities which you wish to breed, or the nearest approach to the type that you can obtain, how do you propose to develop and perfect these characteristics, and maintain them after they are attained? Simply by following the same established principle or law by which every other breed or class of animals has been brought to perfection, viz., by the selection of none but animals which come up to the required standard for perfecting the breed; and as the essential qualities of the particular breed of horses under discussion are soundness of constitution, a high rate of speed, and great strength and endurance, the animals selected to be the progenitors of the race must be submitted to some adequate and appropriate test to determine whether they are really possessed of these qualities or not. The value of such a horse's pedigree, therefore, does not consist merely in a long record of purity of descent from some celebrated sire or dam many generations back, but is determined by what his ancestors have accomplished either on the racing track or on the road, and that the horse is himself a worthy scion of a distinguished stock. The size and conformation of the breed will regulate itself, if performance, and not pedigree alone, is made the test of merit. The size and shape that fulfil the test requirements best are the size and shape to breed. "It is the winners of races that become the breeders of racers," apart from his special form or symmetry. If a proper standard of merit is fixed, and an appropriate test is properly applied to determine whether all the animals selected for breeding purposes come up to that standard, the size and conformation will be governed by results. Artificial selection, when applied in this manner, is just as exacting as natural selection, but much more satisfactory, from an efficient and profitable point of view.

With respect to pace, extraordinary speed for short distances only would not be aimed at in the formation of such a breed, but it is necessary that the horse should have free and fast action when going at his natural pace to enable him to maintain the speed required with ease and comfort for long distances. All experienced horsemen know that a horse with defective form, faulty action, and naturally slow paces, will become much sooner distressed and knocked up when required to perform long marches at a fast pace, than a horse with the same stamina but possessing naturally free and fast action. Hence the necessity of selecting animals possessed of a high rate of speed, in addition to great powers of endurance.

With respect to the question whether the breeding of such a horse as I have endeavoured to portray could be more successfully and profitably undertaken by private individuals or by a Government, I unhesitatingly reply that such horses can be more satisfactorily and economically bred by private individuals, who thoroughly understand their business, than by any Government with its necessarily expensive management. But the breeding of ponies or small horses, such as are recommended by Sir Walter Gilbey and others, on the lines drawn out by them, and purely for military purposes, would not pay any one. Hence, if it is to be undertaken at all, it must be done by a Government at the expense of the country.

PRESENT ASPECTS OF THE VETERINARY PROFESSION.[1]

BY FRANK SOMERS, M.R.C.V.S., LEEDS.

GENTLEMEN,—I appreciate the compliment and honour conferred upon me by the members of this Society by my election as president for the year 1901, and I will do my best to promote and advance the interests of the profession, and establish and encourage the friendly relations amongst its members. The status of the profession is higher and greater than ever, on account of the brilliance and distinguished ability of its members, and the scientific and instructive minds of the many learned veterinarians of which it is composed, who by their moral, social, and advanced educational conditions have shown to their fellow-men that the veterinary surgeon of to-day is on an equality with the member of any other profession. This is shown by the important positions occupied by its representatives, as Mayors of important towns, as Justices of the Peace, Aldermen and City Councillors, &c.

That rapid strides have been made is indicated by the lucrative practices which have been gradually founded and are now conducted with such distinguished success. This is no doubt the result of superior education. That veterinary societies have assisted in bringing about these changes there cannot be the slightest doubt, for they not only maintain and encourage friendly relations amongst the members, but they supervise and protect professional and pecuniary interests.

The National Veterinary Association, which has amongst its numerous members the finest theoretical and practical veterinarians of this age, by its annual gatherings at large and important commercial cities, and by its most practical and instructive papers, has considerably helped to enhance our social position, and brings together all classes of members for purposes of instruction and enlightenment on veterinary medicine and surgery, and by its profound discussions and the general interchange of ideas has proved itself a marked success, a great honour to its founders, and an everlasting benefit to practitioners.

There is another society of eminence and importance, viz., the National Veterinary Benevolent and Mutual Defence Society, which amongst Yorkshire practitioners is often designated the "Manchester Society," and which has for its aims the protection of veterinary surgeons from the consequences of vexatious and unjustifiable actions at law, and also a fund from which assistance is afforded to members of the profession, their widows and orphans. This Society has the full support of our generous colleagues from Lancashire, who combine and co-operate to suppress the grievances and troubles which often arise amongst practitioners, and who by their generosity have smoothed the rough and stormy path of the young member; these objects are most praiseworthy. The profession has every need to be highly proud of the many advantages that are to be gained from this Society, and our Manchester friends need the profound thanks of the profession for their magnanimous labours.

Some little time back, when "motor cars" seemed such a novelty to the public, it was suggested that our old faithful friend the "horse" would soon have had his day, and that for purposes of commerce and general

[1] Presidential address delivered at the annual meeting of the Yorkshire Veterinary Medical Society on 1st March 1901.

town work the motor car would take his place; but I notice such expectations have not been realised, for, with the exception of a few large towns, the evil-smelling and disgustingly noisy motor car is not in general use, and certainly is not in favour with the lover of animals, firstly on account of its terrible cost, but mostly for its general unreliability, and for its chronic desire to go internally wrong when it is most wanted, which places the owner in the most humiliating position of having to procure the services of the discarded quadruped to drag it home, or by manual labour to pull and push it. I can safely predict that the present invention will never take the place of the horse, or ever compare with him for purposes of utility.

During the past few years the Royal Society for the Prevention of Cruelty to Animals seems to have been fairly busy, judging from the number of convictions its advertises, and many comments have been passed on the procedure and conduct of the Society and its officials. After many years' experience, I can say that the inspectors who prosecute and conduct the various cases have a common tendency to exaggerate and distort the facts, keeping back from the view of the magistrates anything likely to benefit the defendant, and expanding, enlarging, and multiplying the facts as against the defendant. Wounds that I have measured with exacting accuracy have been described in court by the inspector, and by policemen aiding him, to be many times larger than my measurements, although I made the examination on the same day. Small, recently abraded raw wounds have been described to the magistrates as old-standing suppurating sores. In the same way the inspectors have a habit of having the horse lame on three legs instead of one, and to generally aggravate the actual condition of the animal.

A very objectionable practice, and one that I have often heard lawyers complain about, and which brings the Society into disrepute, is the method adopted by their inspectors to obtain, by quiet and apparently friendly conversation, from the defendant facts relating to the case, and by artful means obtain a confession of some kind from the owner or driver of an animal, and on the day of the hearing bring all these facts out against them. It would be more in keeping with fair play if the defendants were warned beforehand, and prior to these conversations, that this evidence might be given against them.

Another matter, and the most important one in connection with this Society, is that whatever prosecution it brings forward, whether for wounds and sores, over-working or lameness, or any other form of alleged cruelty, if the bench decide to dismiss the case, they do not allow costs to the defendant. I have seen many cases that have been flagrantly unjust, and when the defendant has obtained the assistance of a smart advocate and two or three veterinary experts, and beaten the Society on its merits, costs have been refused, and although the case is dismissed the costs often amount to a very considerable sum. It is only fair, and just, and equitable that when the Society loses a case it should be condemned to pay the costs. It is a monstrous injustice that it should be otherwise. Magistrates have the full power to allow the defendants costs as in other cases, but they invariably refuse.

These remarks, founded on practical experience in these matters, are not intended for one moment to convey impressions that this Society is not doing humane and noble work, because I appreciate its worth, and, in common with

other veterinary surgeons, have encouraged the praiseworthy efforts it is so constantly pursuing, but I suggest that the Society would have many more supporters if the grievances I have named were remedied. The veterinary profession, from its earliest foundation, has done its utmost to alleviate the distress and suffering amongst dumb animals, and the prevention of cruelty to animals has the support of every veterinary practitioner. The Society's inspectors have too great a desire to record convictions. Whether the number of each inspector's convictions is a stepping-stone to promotion I cannot say, but it frequently happens that a very poor man is summoned before the magistrates and fined when a caution would have met the case in every way.

Another subject of grave importance is that of the "inspection of meat," on account of the many diseases of animals that are transmissible to man, and I regret to say that our sanitary legislation is far behind that of many Continental countries. It is open to serious comment the method carried out by our city corporations—the irregular way of choosing the inspectors. Men are appointed for this important duty without the slightest regard as to the necessary qualifications that ought to be possessed for such an office. A thorough knowledge of meat in health and disease is only the result of a long practical experience, and certainly a knowledge of the diseases of animals during life is necessary in order to have cognizance of the after-death appearances. Let us hope that the "times are changing," and that the day is not far distant when persons with the proper qualification will be those appointed for the inspection of meat, and not farmers, joiners, stone-masons, &c., as in the past.

The medical officers of health are certainly given powers under the Public Health Act respecting meat, and its inspection and seizure, but the medical man has no clinical experience of the diseases of animals, and no practical knowledge which fits him for the work. We have heard of carcases wrongly condemned at Scarborough, at St. Pancras, and other places, and these by medical officers. It would be an immense benefit to the community if the city authorities would appoint veterinary medical officers of health. The city of Leeds is far behind Manchester, Birmingham, Liverpool, London, Glasgow, Sheffield, and other towns. The enlightened authorities of these towns have appointed capable and trustworthy veterinary surgeons, who are specially engaged and give their entire services to the inspection of meat and abattoirs, and the results have been most successful. The larger cities have their veterinary inspectors appointed by the local authority and for work under the Contagious Diseases Animals Act, but they do not give their whole time to their duties. I have heard dissatisfaction expressed that the whole of the veterinary work of a municipal corporation should be chiefly in the hands of one man. One would think that in a large town, where there are so many men of equal merit, that such work should be divided, and each department given in the hands of some reputable practitioner, and then all those professional gentlemen who contribute to the rates would have a share of their town's veterinary work.

The question of tuberculosis is one that has occupied the attention of scientists and professional men for some considerable time, and competent pathologists agree, including those who gave evidence in the Royal Commission on Tuberculosis, that meat from animals with localised tuberculosis is sound and wholesome, but is to be condemned when the tuberculosis is

generalised. Many authorities are erecting sanatoria for human consumptive patients, where they are free from the overcrowding in large cities, and where they can have the maximum of fresh air to combat the distressing and prevalent disease so frequent in our midst, and where they can have the open-air treatment with medical attention,—a very wise and noble course to adopt; but another course which might be pursued with very great advantage, particularly as tuberculosis is said to be commonly transmitted by milk from cows to human subjects, is to have a wholesale and systematic inspection by veterinary surgeons of all farms, mistals, dairies where cows are kept and from which the milk supply of our large towns is obtained, and all cows tested with tuberculin, and every cow that is clearly affected with the disease should be destroyed, and the owner compensated from the imperial purse. This would be the means of removing the chance of tubercular milk being distributed; the cost would certainly be great, but it would be to the benefit of the whole community and would be a very fine sanitary reform. At present tuberculosis does not come under the Contagious Diseases Animals Acts, and consequently living cows suffering from the disease cannot be dealt with by the authorities.

The Veterinary Committee of the Royal Agricultural Society have issued the following findings as the results of their experiments in testing the reliability of tuberculin:—

1. With few exceptions, manifest tubercular disease is discoverable at the post-mortem examination of animals in which there is a decided rise of temperature after the injection of tuberculin.
2. As a rule, no such lesions are to be found in those animals in which there is no decided rise of temperature after the injection of tuberculin; but the exceptions to this rule are more numerous than in the preceding case.

Practically speaking, the exceptions under each of these heads may be regarded as failures or errors in the test, but close examination of the circumstances suggests that some of the exceptions may be explained otherwise than by assuming an inconstancy of action on the part of the tuberculin. Tuberculin falls short of infallibility, inasmuch as there is in every case a period after injection during which it provokes no reaction, and some of the experiments described in the report indicate that this period may be longer than has hitherto been supposed. Even when full account is taken of these possibilities of error, the sub-committee are of opinion that tuberculin is an agent of great value, far surpassing all other methods of diagnosis, and that, if properly employed, it is calculated to render immense service in dealing with tuberculosis.

Considering the immense sums of money spent by the Board of Agriculture for the suppression of swine fever, it does not seem to be abating with satisfactory rapidity, as in the week ending September 1st there were twenty-eight outbreaks of swine fever in England, one in Wales, and none in Scotland, the total of twenty-nine for Great Britain, comparing with thirty-two in the corresponding period of last year. It seems that this disease, which has cost the country hundreds of thousands of pounds, is not likely to be eradicated, as the outbreaks are still of frequent occurrence.

Practitioners will have noticed during the last few years the benefits of the Veterinary Surgeons Act, and the good work done by the Registration Committee of the Royal College of Veterinary Surgeons, as itinerant quack

doctors and so-called practical farriers are year by year becoming less, but the dealers in horse and cattle medicines are as plentiful as ever, each small agricultural show or cattle show having numbers of stalls exhibiting "cure-all" for our domesticated animals. The newspapers and periodicals of this country do great injury to practitioners by the wholesale advertising of common quack remedies, and it is quite evident that as long as they pay the prices for insertion the very best papers will sing their praises, and useless rubbish can be palmed on the public, and the advertisers of the commonest nostrums can monopolise a whole sheet of the morning journal so long as they pay for it. Thus journalism assists in encouraging empirics.

That which engages the mind of the young student will always have interest for the more advanced practitioner, and we may appreciate the advanced conditions of learning and the high aim and objects which superior education has given us; but I doubt whether the preliminary examination which qualifies a man to enter and study at any of the Veterinary Colleges has not amongst its compulsory subjects for examination a few which are somewhat too advanced. For instance, a student has to struggle through and master two or three books of Euclid and several of the foreign languages before he is thought to be fit and proper to enter the portals of the College. Let us hope that the four years' course and the stringent preliminary are not preventing useful men from joining the profession. Pupils are more difficult to obtain now than ever, and the colleges have fewer students, so there is something to account for this decrease.

The closing of the old century and the commencement of the new has been associated with a long and costly war, and the veterinary profession has need to acknowledge with grateful thanks the eminent services rendered by the Army Veterinary Department, who have undergone many hardships and have been terribly overworked. The veterinary officers at the front have been far too few in number, and we hear of troopships with hundreds of animals on board being conveyed some thousands of miles without a veterinary officer on board. These mistakes have already proved the "penny wise and pound foolish" principles. *The Veterinary Record* suggests that the Remount Department needs a thorough supervision, and the purchasing of horses—and examination of the same—should be left in the hands of the Army veterinary surgeon. At present the War Office requires two men to buy each horse. A military amateur to select and choose the animal, and a veterinary surgeon to examine and approve. But there is no need for any military man—the Army veterinary surgeon could quite well undertake the whole duty, and thus save time and expense.

During the past few years some familiar faces have been missed from this Society, and it is with profound regret that I have to add that since our last meeting this Society has lost one of its most cherished Honorary Associates, and by whom—along with a few others—this Society was originally founded. I refer to our late valued and highly distinguished colleague Professor Williams, Principal of the New Veterinary College, who died at Edinburgh on the 12th November last. The news of his death was a shock of painful surprise to Yorkshire veterinarians, and it was only in October last that he read a paper at our meeting on "Some Diseases of the Skin." He had earned for himself a world-wide reputation

for his practical knowledge and skill, and I doubt whether he was not the finest exponent of veterinary medicine and surgery in the whole profession. In the diagnosis of disease he was unsurpassed, and his skill and his wise and valuable services to his profession will never be forgotten. His standard works on veterinary medicine and surgery are used as text-books in all the Veterinary Colleges, his book on "Veterinary Surgery" having passed through nine editions, and his "Veterinary Medicine" is now in its eighth edition. His sudden decease, at the height of his fame, is an irreparable loss to the profession, of which he was one of its brightest ornaments. Veterinary science has lost in him a rich treasure and a valued adviser, an amiable, kind-hearted, and genial man, and one who was beloved by all those persons who had the pleasure of his acquaintance.

ANNUAL MEETING OF THE VETERINARY ASSOCIATION OF MANITOBA.

THE Annual Meeting of this Association was held in the City Hall, Winnipeg, on February 19th — the President, Mr. J. G. Rutherford, in the Chair.

The Report of the Secretary, Treasurer, and Registrar was presented, showing the Association to be in a flourishing condition. During the year the membership had increased to a total of 71. The finances were in a satisfactory condition, showing a balance of $461·91 to the credit of the Association.

The President reported an interesting case of injury to the flexor tendons of the hind leg. Both perforans and perforatus tendons had been cut through in a runaway accident, and some time elapsed before he was called in, another practitioner having been first in attendance. The leg was found enveloped in a plaster of Paris bandage, and when this was removed the wound was discovered to be in a septic condition, with sloughing edges. Fever was high, and the animal suffering greatly. A more rational treatment was adopted, consisting of placing the parts at rest by means of a very ingenious splint devised for the case by the doctor, and by the application of antiseptic dressings. Under this treatment the horse had steadily progressed to recovery, and was now able to resume his severe work of galloping to fires and trotting from them.

Mr. RUTHERFORD then presented a paper on "Intestinal Lesions in the Horse."

Mr. ELLIOTT, of Brandon, followed with a paper on "Influenza in Dogs," giving his experience in a recent outbreak of the disease in Brandon.

Mr. STEVENSON asked Dr. Torrance to give some account of the research into the pathology of "swamp fever," which Dr. Bell and he had undertaken.

In reply Dr. TORRANCE said that he hoped at a future date, when the investigation had reached more definite results, to make a written report on the subject. At present he would only briefly refer to the work that had been done. A small sum of money had been granted by the Government for this research, and they had purchased two horses upon which they had made experiments by inoculating them with pure cultures of the large bacillus which had been discovered in several cases of this so-called swamp

fever. In one horse they had been partially successful in producing a modified form of the disease, but the other had proved refractory. This might have been owing to natural immunity, or to attenuation of the virus from artificial cultivation. They had also made several post-mortem examinations, had made temperature charts of cases for long periods of time, and had made numerous examinations of blood as well as blood counts. In conclusion, he pointed out the importance of continuing the investigation into a disease which is probably the greatest menace to horse-owners in this Province, and asked the co-operation of the members in securing a further grant for this object, and in contributing their experience with the disease.

Several members spoke on the subject, and all agreed as to the importance of the investigation.

It was moved by Mr. C. LITTLE, seconded by Mr. STEVENSON, and carried unanimously, that this Association petition the Government to make a further grant to Drs. Bell and Torrance for the purpose of continuing their research into swamp fever in horses.

It was moved by Mr. COXE, seconded by Mr. Martin, that the sum of $50 be given to Dr. Torrance for his services in this research. Carried.

The meeting then adjourned.

ANTITOXIN TREATMENT OF TETANUS.[1]

BY J. STORIE, M.R.C.V.S., EAST LINTON.

ALLOW me to thank you, gentlemen, for the honour you have done me in electing me President of this Association for the coming year. I can assure you that I shall do everything in my power for the welfare of our Society, and with the assistance of my friend Mr. Aitken, our new Secretary, we trust that the Society will continue to be a source of interest and benefit to the profession in this neighbourhood. I am sorry to say the attendance at our meetings for some time has not been as it should be, the absence of many of the younger members of the profession being especially noticeable, undoubtedly to their loss as well as to ours. There is a great deal to be gained by the discussion of subjects, new as well as old, and by the experiences and ideas of the different members being exchanged and ventilated.

Alas, that so many of the good old members should have passed away, never to return. But why, I ask, should the chairs remain vacant? Surely it falls on the young practitioners to fill up the ranks and take their places here as well as in the busy world. There are many veterinary surgeons within easy travelling distance of Edinburgh, who, I am sure, would be greatly benefited by attending our meetings.

There must be no standing still in our profession. We learn every day of new diseases, new medicines, new and useful instruments, tests for tuberculosis and glanders, the use of mallein and antitoxins. Undoubtedly we are advancing, and one of the best ways of keeping in touch with that advancement is by attending meetings such as ours.

Perhaps the most extensive and interesting subject before the medical and veterinary professions of the present day is bacteriology. The dis-

[1] Presidential address read at a meeting of the Scottish Metropolitan Veterinary Medical Society on the 27th February.

coveries made during the last few years with regard to bacteria and their habits have been quite astounding.

The medical profession have found a means of relief and cure of that terrible disease diphtheria, a product of the very offending bacteria themselves being used. The use of tuberculin is and will be a great factor in the stamping out of tuberculosis from our herds and dairies, and thereby preserving human life. Wonderful experiments have been and are being made in the purification of sewage by bacteria, and it looks as if soon all sewage and refuse will be disposed of in this manner, many towns having already adopted the system. Not far from Edinburgh, at Glenkindie Distillery, large bacterial tanks are being constructed for the purpose of purifying the refuse.

The pathogenic or disease-producing bacteria are those in which we are interested. These bacteria by their growth and multiplication produce specific poisonous substances which we call toxins. These toxins, when produced by the bacteria in the animal body, are in most cases the cause of disease—not the actual presence of the bacillus itself. It is a very remarkable fact that these toxins have been found to be definite chemical bodies, quite different in composition from the bacillus itself, the latter only in some instances being poisonous.

Now as to antitoxins. When an animal has survived an attack of a given species of these bacteria, it is found that the blood has become capable of resisting a fresh invasion of these same bacteria. Not only that, but it has also become impervious to the action of the toxin. This power of resistance is termed immunity.

Now animals which are in this way immune have a something in their blood which, when injected into the body of an already infected animal, restrains the life of these bacteria, and also counteracts the toxins which, as I have said before, actually produce the disease; this something is what we call an antitoxin.

To-day I wish more particularly to bring before you this Antitoxin treatment of Tetanus. I question if the mere producing of immunity would be of much advantage to us of itself, although in some districts in France it has been advantageously practised where castration was invariably followed by tetanus; in fact it proved quite a success, as colts can be operated on without any such danger after immunity has been produced. During the past eighteen months I have treated six cases of tetanus with serum, and I propose to describe them so that you can judge for yourselves whether it is of any benefit or not.

Tetanus, as you are aware, is due to a micro-organism known as the drum-stick bacillus from its resemblance in outline to a drum-stick. Like plants and animals, bacilli have their suitable soils and climates in which they thrive and flourish, this particular one being partial to garden mould and other earthy mixtures, and also thriving locally in the body,—not in the blood, as is often the case. It has also a dislike to oxygen, hydrogen being more to its taste. The antitoxin is prepared by cultivating the bacillus in an atmosphere of hydrogen; this cultivation is filtered through porcelain for the purpose of separating the toxin from the bacilli. Then the toxin is injected into a healthy horse, in gradually increasing doses, each day for about three months, until immunity is produced; after which a quantity of blood is withdrawn from the immune animal and allowed to stand for some time, when the serum is drawn off and allowed to coagulate; after which it

is preserved in bottles, to be used in the treatment of tetanus, or dried and powdered to be dissolved when required. It can also be used for the purpose of producing immunity in healthy animals.

Now I will proceed to describe the cases I have treated with this serum. I have dispensed with the terms idiopathic and traumatic, which have been invariably used in describing such cases, as I do not believe there is such a thing as idiopathic tetanus. If there is no external wound there must be some internal inlet for the bacillus, possibly an injury to the alimentary canal or to the trachea.

Case I.—June 26th.—Was asked to see a grey pony, about 14 hands, ten years old, had fallen a fortnight previously and broken both knees. Symptoms of tetanus clearly marked; tail elevated, *membrana nictitans* drawn half over the eye, hind legs wide apart, off fore knees very painful, jaws just sufficiently free to admit of physic being given.

Had knee well fomented, and dressed with a lotion of bichlor. and opium; two 6 dr. physic balls given, and 40m of the antitetanin serum injected under the skin of the breast. The animal was placed in a quiet stable and the windows darkened. It had by this time become very much excited and the symptoms aggravated.

In the evening other 25m of the serum were injected, oatmeal and bran drinks were given, and some grass cut very short was placed in the manger.

June 27th.—Very little alteration, knee still very painful, had it fomented and the lotion again applied; gave 25m serum morning and night. Oatmeal and bran drinks were taken, and grass cut in the same way as formerly given.

28th.—No change, but certainly no worse; had slings put on, as the patient seemed very tired. From the nature of the pony I was afraid to do this; however, after struggling for half an hour, it became reconciled to the support. Gave 30m serum and food as before.

29th.—Condition much the same as yesterday, 25m serum in the morning and same at night; food the same as before.

30th.—Slight improvement, eyes more natural, tail not so stiff; 25m serum given twice, and food as before.

July 1st.—Much improved, standing more natural, jaws much freer, and altogether the patient seemed much more comfortable; 25m of the serum once to-day.

2nd and 3rd.—Continued improvement, eating bran, oats, and grass freely; 20m serum injected each day.

5th.—Slings were removed and the patient put in a loose-box. Recovery was complete in a few days.

Case II.—October 22nd.—A Clydesdale gelding, four years old; a big heavy animal, 17 hands. Muscles of hind quarters and back very stiff and hard, jaws slightly closed; managed to give two 8 dr. physic balls, and injected 50m serum. Taking food moderately well.

23rd.—Symptoms much the same, hind legs spread wide apart, and muscles of quarters hard as a board; 50m serum injected.

24th.—No change, physic operating freely, consequently patient rather dull and thirsty; 50m serum injected.

25th and 26th.—Much the same, muscles of quarters not nearly so hard; however, 50m serum given each day.

27th.—Could not visit.

28th.—Disappointed to find the hardness of the quarter muscles as bad as ever; gave 60m serum.

29th.—Again some improvement, muscles being much softer and jaws moving more freely; 50m serum injected.

30th.—Could not visit.

31st.—As formerly; when the serum was missed on the 27th, there was a return of the muscular contraction, quarters being again very hard; gave 50m serum. I was informed by the attendant next day that in a few hours there was a complete change, the muscles having become moderately soft, and that altogether there was a marked improvement.

The serum was injected in 50m doses for the next two days, and from this time recovery was gradually completed.

Case III.—January 13th.—A thorough-bred entire colt, three years, exhibited all the symptoms of tetanus. Gave 10 dr. aloes. Unfortunately this case had to be travelled about half a mile to its owner's stable. Not having expected a tetanus case, the serum could not be given to-day.

14th.—Found the colt much worse, muscles all over the body being very stiff and hard; injected 40m serum; gruel and bruised oats were partaken of moderately well.

15th.—Much the same as yesterday, physic operating freely; 40m serum given.

16th.—Not much change; if anything, slight improvement; 40m serum given.

17th.—Not visited.

18th.—Muscles much softer and appetite good; gave 40m serum.

19th.—Marked improvement; moving freely about the box and eating greedily; 30m serum.

22nd.—Next visit still improving; gave 30m serum.

23rd.—Was wired for, as patient had laid down and could not rise. Managed to get him up and put the slings on for a few days, and, as the muscular contraction had disappeared, no more serum was used. By Feb. 1st colt was quite convalescent and able to have exercise.

Two other cases were quite similar and treated in same manner; both recovered. The last case I had was that of an old mare, 23 years of age. From the very first the symptoms were of the most acute character; jaws were tightly closed, and the whole body seemed one solid piece. I injected 50m serum on each of the three days that it lived, but it never drank, and barely ever moved from the time I saw it. It was found dead the next morning.

Remarks on the foregoing Cases.

The first case was a really bad one, and I am satisfied that under the old treatment would have succumbed. The patient was a bad one to begin with, squealed and tried to kick whenever it was approached; the symptoms were severe at the outset. After the injection of the serum the jaws did not appear to get stiffer, and you will observe that the disease ran its course in ten days, whereas three weeks was about the duration under the old treatment. Serum injected twelve times.

In the second case slings were not used, as the place was quite unsuitable for that purpose. It was most marked on the days after the serum had been omitted that the muscular contraction was increased, and especially that on one of these occasions, almost immediately after the injection of the serum, that condition was relieved. Serum injected ten times.

The third case was not a very favourable one, as the colt had been very little handled, and was difficult to manage, consequently he was not slung at first. The tetanus lasted only nine days. Serum injected six times.

With the exception of the physic, of which I make a practice of giving just double the ordinary dose, no medicine of any kind was given in any of the cases, as I was determined to give the antitoxin treatment a fair trial. I will leave you to judge by the results whether it is worth your while to give it a trial, if you have not already done so.

Mr. RUTHERFORD, in proposing a vote of thanks to Mr Storie for his excellent paper, said the members were deeply indebted to the President for bringing before them a matter worthy of much discussion, and took note of the large doses of physic he usually gave. He (Mr. Rutherford) was not quite so sure of the serum treatment being successful, but would be glad to give it a trial. He thought Mr. Storie had a great many cases in his district; he had only had seven or eight cases within the last five or six years, but in earlier years, in India, he had a great number of cases following all kinds of wounds notwithstanding the antiseptic treatment, and had cases of recovery; then the tide would turn and as many would die. In hospital the horses were paraded night and morning; when the first symptoms were observed the treatment consisted of physic and Indian hemp, the patient being kept perfectly quiet and in the dark, and slung if possible. If the patient got over the eighth or ninth day, a recovery was pretty certain. Recorded case of a horse with wounded foot: Tetanus set in five or six days afterwards, wound did not suppurate freely (he preferred the wound to suppurate freely), he applied terebene fomentations in this case, and a recovery followed. He instanced other cases following castration and wound on quarter, where he induced free suppuration, and recovery followed. He also drew attention to the few cases that followed the use of the actual cautery.

Mr SPRUELL, Dundee, gave his experience, and recorded eight consecutive cases of recovery under the H.C.Y., and thought he had the cure, but the tide turned and he lost as many. He had also tried the serum treatment, but as yet without success; his success on the one hand might be due to the absence of physic, or *vice versa*.

Mr. CONNOCHIE had also tried the serum treatment without good results; at one time he had five out of six recoveries with pot. bromid. and no physic; he failed to see how Mr. Storie administered the physic in his cases, as he had always found it impossible to do so.

MAMMITIS.[1]

BY W. L. WILLIAMS, PROFESSOR OF SURGERY AND OBSTETRICS, NEW YORK STATE VETERINARY COLLEGE.

IT is neither the purpose nor desire to offer under present limitations a full discourse upon so important a malady as mammitis, nor to present anything very new or remarkable. Things appear differently according to the position from which they are seen, and it is only by observing an object from every possible point of view that we can secure a perfect impression of it,

[1] Read before the Genesee Valley Veterinary Association, Rochester, N.Y., July 13, 1900.

and it is merely hoped to offer here a few old ideas from what may possibly be to some of you a new vantage ground, and perchance renew an interest in an old and important theme in the work of the every-day veterinarian.

For our purposes we shall look upon mammitis as wound infection, not theoretically, though that is frequently the case, but practically. The "wound" consists of the delicate lacteal cells lining the alveoli, the more protective and older of which are shed at the period when mammitis is most prone to occur, leaving a surface little less resistant against infection than a real wound; the orifice in the teat serves to maintain communication with the exterior, and the milk within the gland, milk sinus or cistern, represents in our plan the blood or lymph poured out into the wound cavity, acting as a foreign body and serving as a nidus for bacterial multiplication, upon which the living bactericidal tissues can exert but little influence. We shall enter into no argument as to the correctness of this view, since this is not essential to our purpose.

Upon this hypothesis mammitis may be caused by any of the known pathogenic micro-organisms capable of causing wound infection in the ordinary technical sense, such as the various pus-forming streptococci, staphylococci, and bacilli, with the occasional addition of special forms like actinomyces and bacilli tuberculosis. So far as known, any bacteria capable of inducing wound infection is alike competent to produce mammitis, and, conversely, any of the micro-organisms found in mammitis are probably capable of infecting wounds.

Viewing the mammary glands of domestic animals as seats for wound infection, they offer interesting variations and resemblances in the different species. As in other organs, mammitis occurs more frequently as the milk-producing qualities are intensified by breeding or feeding, so that it is observed most commonly in ruminants (cow, goat, ewe), and far more frequently in the dairy than in the beef cow.

We have suggested that the milk retained in the udder might be compared to blood or lymph extravasate in a wound, in which case the larger the volume of milk retained in a body the greater the source of danger, and we find this borne out again by our observations that animals having commodious milk cisterns, like the cow, goat, and ewe, suffer most frequently and acutely from mastitis, although otherwise more immune against wound infection than some other animals. Franck has also pointed out that in udders possessing milk cisterns the infection is general in that division of the gland emptying into the infected cistern, so that in the cow usually an entire quarter is infected, while in carnivora the infection may be limited to a lobule of the gland. Udders without milk cisterns are notable vulnerable to carcinoma, sarcoma, and actinomycosis, thus suggesting that a large quantity of milk in a cistern where it plays the part of a foreign body in relation to infection invites acute purulent disease, while in the absence of this the more chronic and permanent infections are liable to occur.

The method of infection may vary, and as Vennerholm (Bayer and Fröhner's Handbuch, B. II., Theil III.) and others hold, may be through the medium of the blood or lymph stream or through the teat orifice. The infection of the udder by means of the blood or lymph stream, like in ordinary wound infections, speaking from a clinical standpoint, is well-nigh unknown, except perhaps tubercular mastitis, and we shall therefore not consider this phase of the question further.

As in ordinary wounds, the infection occurs almost always by methods

readily understood, through the teat orifice, which from our point of view represents the wound opening. Aside from the predisposition to mastitis owing to extreme development of the milk glands and the presence of a milk cistern, we should expect, and do find, the affection most common in those animals the teats of which most frequently come in contact with putrefactive substances, such as rapidly decomposing excreta, retained placenta and the like, and these conditions are best filled by ruminants, the prominent inguinal udder with its long teats being unusually exposed to contact with infective material while the animal is recumbent, the long teats being compressed, bent, twisted, possibly even somewhat opened and not rarely actually wounded.

In the quadruple udder of the cow, the posterior quarters, being more exposed, naturally suffer most.

The origin of the infection, as in ordinary wounds, varies greatly. First of all we must recognise the presence almost universally within the udder of bacteria capable under favourable conditions of inducing disease.

The popular notion that milk within the udder is sterile has been quite thoroughly disproven, and it has been found by investigators, among whom we may name Mr. A. R. Ward, Cornell University, that the active udder is rarely if ever wholly free from bacteria, the flora being extensive, and including streptococci, staphylococci, and bacilli of varieties only awaiting favourable conditions to demonstrate their pathogenic power. These we liken to the bacteria found living upon the patient's skin ready to generate inflammation upon the occurrence of an injury to the part. They are in fact closely allied to skin bacteria. Aside from this inevitable danger, the contact of the teat orifices with putrescent dung and urine when the animal is recumbent, not infrequently perhaps even the introduction of a soiled piece of hay or straw through the orifice into the milk cistern, the contact with the teat openings of decomposing retained placenta, the trickling down over the udder and teats of discharges in cases of metritis and vaginitis, or soiling the udder and teats with these discharges through the medium of the tail, all account in a general way for the origin of the disease. The presence of suppurating wounds on the skin of the teats almost always leads, as is well known, to severe mastitis, evidently by the micro-organisms finding their way to and through the teat opening. In the same way cow-pox, sheep-pox, contagious aphthæ, and other eruptive affections of the teats lead commonly to mastitis, not perhaps through extension of the disease itself into the gland, but by the secondary suppurative affection leading to infection through the teat orifice.

Viewing mammitis as wound infection, all cases are in a broad sense transmissible, but we find outbreaks of mammitis especially in ruminants, which are known as contagious or infectious mammitis, and which at times become enzootic over a wide area and cause severe losses to stock-owners, besides rendering questionable the wholesomeness of the milk supply. In any of the foregoing cases there is no essential bar to transmission from one animal to another, and frequently we note clinically the extension of mammitis from one quarter or half to another, evidently by the same but more concentrated means by which it could be carried further to other animals either near or remote. In the so-called contagious forms, so far as known, the infection possesses a more marked preference for the milk gland as a habitat, and acquires a degree of virility which greatly favours transmission, and the means which might occasionally carry infec-

tion under ordinary conditions now becomes an effective and common bearer of contagion from infected to healthy, so that infected bedding or floor may answer, or the tail may transplant the infection from cow to cow, while the milker carries the disease from affected to healthy on his unwashed hands, or if this is not enough, uses milk from an infected cow to moisten the teats of a healthy one, and transmits it in this way through the milk. In a recent outbreak of mastitis in ewes, investigated in our clinics, it was found that the lambs were puny and emaciated, and upon close examination it was observed that they had a pustular eruptive affection of the lips and nose, caused apparently by streptococci, which were not distinguishable from those found in the gangrenous udders of the affected ewes.

Here then we had good clinico-bacterial evidence of transmission from lamb to ewe, and *vice versa*, in nursing.

If we carry our comparison further we have an exceedingly vascular glandular tissue enclosed within a firm sheath of yellow elastic and fibrous tissue from the abdominal tunic, which, once the parenchymatous tissue becomes engorged or inflamed, the investing aponeurotic capsule prevents yielding to the swelling, leading to compression of the inflamed tissue with impairment of circulation. The channel through the teat serving as an exit for wound secretions, while dependent, is anything but free, clots occluding the passage, while higher up the swelling of the gland tissue closes the milk ducts. The inflamed part is also dependent to an injurious degree, which cannot be materially modified by changing the posture of the patient, nor have we yet succeeded markedly in fostering a better circulation by mechanical support of the gland.

The symptoms are ushered in usually by an abnormal condition of the glandular secretion, the milk may be clotted, watery or tenacious, odourless or fœtid, white, yellow, bluish, or, if containing blood, reddish; in gangrene it becomes chocolate coloured, the amount is decreased in varying degrees, in many cases to an almost or complete cessation, which may prove temporary or permanent. Microscopically it consists of clots of casein, decreased amounts of casein, fat, and sugar, increase of salts, sometimes red blood cells, generally pus cells, and bacteria in abundance and of various kinds.

The colour of the skin covering the affected gland as in wound infection differs,—in some forms it is unchanged, in others there appear varying degrees of redness, according to the intensity of subcutaneous inflammation, and when gangrene threatens or becomes established, the colour becomes a dark livid or black.

Swelling may be absent throughout the attack, especially in a common form of so-called contagious mastitis of cows, the "gelber galt" of the Germans, while the other extreme is observed in acute gangrenous mastitis of cows and ewes, where the affected parts swell rapidly and extremely, the swelling extending to the surrounding parts, as the perineum, inferior abdominal walls and thighs; the swelling of these adjacent parts partaking chiefly of an œdematous character. Between these two extremes every degree is observed, the character varying from a rather yielding, œdematous swelling in acute cases, to firm, hard schirrhous masses seen in chronic mastitis of cows and the so-called botryomycosis of the udder of the mare.

The local temperature, as revealed to the touch, is as variable as the swelling or colour. Usually there is well-marked heat, which may be very

intense in acute cases, but frequently absent in chronic attacks and in the "contagious mammitis" or "gelber galt."

The advent of gangrene, if the skin be involved, is indicated by coldness, usually accompanied by moisture of the parts and detachment of the cuticle upon touch, but if the gangrene is confined to the deeper parts of the gland the skin may not reveal its presence in this way, though usually the teat of the affected gland gives early indication of the processes taking place within.

Pain in the affected gland varies and is differently expressed. Usually the animal resists milking or the nursing of the young by moving or kicking, hesitates in severe cases to lie down, and walks as if lame in the leg on the affected side, or with a straddling gait when both sides are affected.

The constitutional symptoms offer even greater variations than the local changes, and consist essentially of the symptoms of wound infection. Constitutional symptoms are frequently absent, notwithstanding grave local disturbances, even to the formation of abscesses and gangrene. They include changes of body temperature, including fever or elevation and subnormal temperature in coma or collapse, and changes in the circulation, usually a marked increase in rapidity of the heart-beat, with either increase or diminution in the fullness of the pulse, while respiration behaves in rather close conformity with circulation. The digestive system suffers early and severely. In ruminants the muzzle tends to become dry and hot, and rumination ceases. The appetite is depressed, bowels torpid and constipated, or diarrhœa is present. Metastatic inflammations occur in various joints. Paralysis, as a result of toxæmia, is occasionally observed in the cow.

The course may be acute or chronic. I have observed death in ten to twelve hours, while many cases drag through weeks or months. Usually it extends over a period of five to fifteen days.

The prognosis is grave. The so-called recovery or resolution is largely theoretical. Not only is the activity of the affected gland generally diminished, but there is a constant tendency to recurrence with each calving. Occurring usually a few days after parturition, mammitis brings about a serious diminution of milk secretion, for that milking term at least, frequently destroys the function of the affected gland permanently, causes great emaciation, renders the milk from other portions of the gland unsafe for human food during the disease, and not infrequently causes the death of the patient.

The treatment constitutes one of the most perplexing problems in veterinary surgery.

Viewing mammitis as a wound infection, we at once turn to disinfection as the fundamental principle of treatment, and our entire energies need be directed to the one end. We have compared the milk within the inflamed udder to the lymph and blood within a wound, and naturally we would wish to remove this as promptly, frequently, and perfectly as conditions will permit, the same rule applying with equal force to pus or other wound secretions. It may be milked out in the usual manner, but if very much clotted it may be advisable or necessary to dilute and break up the clots by injecting into the gland a 1 per cent. soda solution at 100° F., to which may be added 3 to 5 per cent. hydrogen peroxide. Fomentations and massage also facilitate its withdrawal. This mechanical removal of

abnormal milk mixed with disease secretions removes bacteria and bacterial products in a degree worthy of consideration, but the chief disease changes and absorption of morbid products are taking place within the acini of the gland and the deeper structures, and are not so favourably affected by the milking process as desired.

It has been proposed to disinfect the inflamed gland by the injection of antiseptic solutions, and various preparations have been recommended or proposed without thus far demonstrating their practicability. Sublimate, carbolic acid, boric acid, and others have been used, with apparently the best results from a weak solution of boric acid, which really amounts to little more than sterile water, and has led some writers to suggest that the washing of the milk cistern and sinuses by means of the sterile water and milking this out constitutes the real advantage of such treatment.

Two serious obstacles stand in the way. First, the irrigation is incomplete, as the fluid cannot be made to penetrate far into the gland, the swelling of the lacteal cells filling the acini. Only one to two pints usually can be injected at a time into a quarter of the udder of a cow, and this we cannot imagine as coming into intimate contact with the great secretory area. Second, antiseptics irritate the gland seriously, so that the more common members of this group of drugs dare not be introduced into the udder of a strength to cause the death or check the multiplication of bacteria.

Corrosive sublimate, carbolic acid, &c. are not allowable unless in cases of extensive suppuration where the solution comes in contact with virtually or actually an abscess wall. Peroxide of hydrogen has given us the best results among this class of agents. But we must confess that the drug is theoretically superior to all others, we have neither tried nor seen an account by others of its trial. It seems clear to us that the best preparation possible for this use is iodoform, which, being comparatively insoluble, would remain in the gland for some time, gradually liberating iodine and inducing no irritation, but acting as a local anodyne. It should be injected dissolved in one of the lighter fats, olive oil, liquid vaseline, or butter fat. We hope to give this remedy an early test.

Disinfection by external application—that is, by cutaneous absorption over the gland—has always held an important place in the treatment of mammitis. The skin now becomes the irritated part, if any, and any disinfectant which will not injure the cutaneous covering of the gland becomes available, while those which are most readily absorbed possess the highest value. So Bang and others extol highly iodine and camphor, while from the same standpoint others commend turpentine as an external application.

Indirectly much that is apparently done for other objects operates in a similar manner. Belladonna, hyoscyamus, and other members of their group probably are in a degree directly antiseptic, but largely indirectly by stimulating the vessel walls, causing their contraction and leading to a more effective circulation, always inimicable to the life of the germs of wound infection. Blood stasis on the other hand favours their growth.

Massage and fomentations tend in the same way to check bacterial production. For the same reason Vennerholm and many other writers favour the use of suspensories with poultices, while still others commend the application of various adhesive applications which in drying contract and tend to relieve congestion by mechanical support.

Systemic disturbances demand the practitioner's attention, and it is questionable in many cases whether the local or constitutional treatment is the more important. We know that pathogenic bacteria largely lose their power of multiplication and of injury in the absence of their products, hence if the system can successfully eliminate these an essential arrest in the progress of infection has been made.

The eliminative agent recommended is purgation, and in the past this has been largely confined to the use of saline and oleaginous cathartics. While their value cannot be denied, they are defective because of slowness of action in acute cases where time is all important.

More effective theoretically are pilocarpine and eserine, which act within ¾ to 1½ hours. They have the advantage of promptness, they can be quickly repeated until desired effect is had, and while stimulating the action of the bowels, at the same time arouses, with energy, excretion by almost every gland in the body, markedly the salivary and cutaneous, and it has appeared to us the milk glands also. These drugs have an effect closely allied to the hypodermic or intravenous injection of salt solution and the intra-mammary injection of Schmidt in the treatment of parturient paresis. This latter is, of course, not available in mammitis.

In a case of acute mammitis of all four quarters in a cow, following Schmidt's treatment for parturient paresis, where gangrene and death appeared imminent, the administration of pilocarpine and eserine in combination reduced the temperature from 106° to 103° F. in three hours, the tumefied udder had greatly relaxed, milk had returned, rumination had been resumed after several hours' cessation, appetite and thirst had returned, the muzzle was again moist, and the general appearance had changed from dullness and indifference to cheerfulness and a lively interest in her calf. We have no doubt but that pilocarpine and eserine promptly administered in small and frequently repeated doses will prove of very great benefit in acute mammitis. We would suggest as a dose for the cow 1½ to 2 grains eserine and 1 to 1½ grains pilocarpine subcutaneously, repeated hourly until the purpose is attained. Should these be unattainable, we have little doubt that the intravenous injection of 2 or 3 pints of saline solution would answer a similar purpose.

Should these lines of treatment fail us, and suppuration or gangrene occur or fatal toxæmia threaten, operative treatment is warranted or demanded. An extensive abscess in a gland means its total ruin or at least practical uselessness; partial destruction generally inviting recurrent mammitis with each calving, with special danger of infecting neighbouring glands. As in any other abscess, free opening and dependent drainage are indicated, and for this there are two plans: first, a free incision through skin and dartos into the abscess cavity, parallel to the long axis of the teat, followed by appropriate treatment by disinfection and antiseptic packing; second, amputation of the teat at such a point as will afford sufficient drainage. The incision into the gland itself would be preferable in most cases, because when free it relaxes the dartos and thus relieves the pressure upon the inflamed gland. In chronic induration of the gland with emaciation of the animal a free incision through the dartos and into the centre of the glandular tissue, the incision extending from the highest point of the affected gland to the base of the teat, relieves the engorgement and acts in the same manner as a free incision into an infected punctured wound penetrating a firm aponeurosis. Such treatment is of course only admissible when hope of recovery of the gland has been abandoned.

When gangrene appears or the life of the animal is threatened, amputation of the gland is indicated, though possibly not always imperative, while in chronic induration, with unwieldy enlargement of the udder, amputation is frequently advisable because of the annoyance of the enlarged gland to the animal and the probability of recurrent attacks of inflammation. The general rule in reference to amputation would be to operate as soon as the gland has passed beyond reasonable prospect for recovery and consequent future usefulness, and threatens at the same time the animal's life or its value aside from the infected gland. The so-called botryomycotic mammitis of the mare generally demands amputation, as do also the neoplasms in the mammæ of the bitch.

This operation, not prominently described in English, is simple, comparatively safe, and its results usually highly favourable. The arrangement of the glands makes it practicable to amputate half or all the gland. In the cow the intimate connection between the two quarters of each side make it impracticable to amputate a quarter, while the septum formed from the abdominal tunic between the two halves makes them readily separable. In gangrene prompt operation is demanded, while in botryomycosis, induration, &c., delay and deliberate preparation may be warranted.

Technique.—Secure the animal in such a position as to expose the affected gland freely (dorsal or lateral decubitis), anæsthetise the animal, cleanse and disinfect the operative area; if the skin is healthy, preserve enough to cover the wound area after operation (if gangrenous remove all gangrenous portions), and make a free incision under antiseptic precautions through the skin at the lower part of the udder from before to behind, the length of the gland, the line of the incision being lateral to (outside) the teat, and follow this by a second similar incision, beginning and ending at the same points, but passing on the median side of the teat, thus isolating it in the centre of an ellipse, the extent of which should vary with the size of the gland. The skin is then detached with the fingers or a blunt instrument toward the median raphé and upwards toward the thigh. Bleeding vessels are seized with compression forceps, cauterised or ligated. The only vessels demanding ligation are the subcutaneous abdominal vein and the small artery accompanying it in front, and the chief vessels of the gland, the external pudic arteries and veins emerging from the inguinal ring; the others can be controlled by cautery or temporary compression.

After the skin is well detached, the capsule of the gland (dartos) is cut through along the median raphé, and on the external side between the superior surface of the gland and the abdominal walls, and the detachment of the gland continued by tearing through the loose connective tissue until finally the gland has but one attachment, the bundle of inguinal vessels composed of pudic artery and vein, with nerves and lymphatics. These are long and extensible, and should be ligated *en masse* high up against the ring and then cut through as low as possible, leaving a long stump from which the ligature will not slip. After severing the vessels and removing the gland a separate ligation of the pudic artery is a wise precaution, as severe after-hæmorrage sometimes occurs. The ecraseur is not to be trusted as a hæmostatic for the pudic vessels. If both halves are gangrenous, remove the second half in the same manner. The wound should be closed as well as admissible with sutures, and drainage provided by drainage tubing or antiseptic gauze or packing, followed by ordinary treatment for wounds. We should bear in mind that amputation of the udder

is by no means so serious as would be thought at first glance. Encapsuled within the aponeurotic sac derived from the abdominal tunic the gland has little intimate connection with adjacent tissues, so that in amputation but little violence is done to important tissues. We had occasion recently to remove the entire gland from a two-year heifer on account of gangrene. The udder was enormously swollen and would weigh about 40 pounds, was black, cold, œdematous, and from each teat a dark brown fluid constantly dropped. The eyes were sunken and listless, the pulse imperceptible, the gait tottering, and every indication pointed to early death. She was cast, the parts disinfected, and the entire udder, skin and all (the skin being gangrenous), was removed, leaving an open wound surface of 3 to 4 square feet. The wounded tissues were extremely fœtid and attracted swarms of scavenger flies. Alcoholic stimulant were administered and the wound treated by frequent washing with 1-1000 sublimate solution. The patient rallied at once and made an uneventful, though necessarily somewhat tardy recovery. The case serves to demonstrate the value of the operation. The patient is of course useless for milk purposes, but available for beef, and were she a valuable pedigreed animal could still be used for breeding. When but one-half of the udder is removed, the animal will yield a fair amount of milk, more than one-half, probably about 75 per cent. the normal amount.

In cows not valued for breeding and, where calving would invite recurrence, the animal should be spayed, and when through milking, sold to the butcher.

The control of outbreaks of infectious or enzootic mammitis should be based wholly upon disinfection, the process being thorough in every detail and applied to every possible source of danger. Affected animals should be kept apart from the apparently healthy, milked and cared for by separate persons and utensils if possible, and the secretions from the gland should be effectively destroyed. If separate quarters, caretakers, and utensils are not available, the affected cow should be milked last. The stable should be kept clean, dry, and disinfected, preferably with dry disinfectants, while the milk vessel, the udder, and the milker's hands should be thoroughly disinfected severally,—that is, the milker's hands and the milk pail should be disinfected after milking each apparently healthy cow in an affected herd, to guard against infection from an apparently healthy animal which may be actually diseased. Young animals which are permitted to suck should receive attention as disease bearers. In the severe outbreak of gangrenous mammitis in ewes, which we have mentioned above, it was found that the lambs were suffering from pustular eruptions of the nose and lips. The free application of silver nitrate to the ulcers and bathing the diseased lips freely with tr. iodine and glycerine, equal parts, promptly arrested the mammitis in the ewes. This outbreak suggests that in every case we should seek for the source of infection and attack it. In ordinary mammitis, the general rules for controlling the so-called contagious species should be applied to the more limited field to prevent the affection from spreading from gland to gland.

Note.—Mr. Borrowman, M.R.C.V.S., Cupar-Fife, successfully removed the whole of cow's udder about three years ago.—(Ed. VET. JOUR.).

MEAT INSPECTION.

BY ALFRED HOLBURN, M.R.C.V.S., CHIEF VETERINARY INSPECTOR, CORPORATION OF MANCHESTER.

(*Continued from page* 100.)

The Spleen.—Commonly called the melt. Its external surface is frequently affected with tuberculosis, and occasionally the splenic pulp also. This organ is important in the diagnosis of anthrax; particular attention should therefore be paid to its volume and consistency. Its lymphatic glands are usually left attached to the left side of the stomach.

Uterus.—Also termed the calf-bed or lamb-bed, as the case may be. Inflammatory diseases, tuberculosis, and septic conditions are chiefly to be looked for.

Heart and Lungs.—These organs are removed from the chest, together with the mediastinal tissue and fat attached. It is important that the following lymphatic glands should be looked for, namely :—

(1) *Tracheal Glands.*—On the course of the trachea, on its upper surface.

(2) *Cardiac Glands.*—At the base of the heart, and must be looked for before the organ is severed from the lungs.

(3) *Bronchial Glands.*—At the bifurcation of the trachea into the two bronchii. The right gland is sometimes torn away, but the left is always to be found by cutting down on the left bronchial tube.

(4) *Mediastinal Glands.*—This group of glands will be found in the form of a chain running in the mediastinal tissue between the right and left lungs on the œsophagus. They are of large size.

The lungs must not be stripped of their fat until these four groups of glands have been examined, otherwise they will be removed. Their examination is necessary in all inflammatory and blood diseases, and in tuberculosis they should never be overlooked. They are frequently found affected when this disease is not apparent in the lung tissue—an item to be remembered in making post-mortem examinations after the tuberculin test. All other diseases of the lungs and heart are of course to be looked for.

The Mammary Glands or Udder.—The mammary glands are two in number, and are placed side by side on the middle line of the abdominal wall in front of the pubes. They form here a single mass with a furrow between them; each gland consists of a fore and hind quarter. The term "udder" is used to include both glands.

The udder of the cow when boiled constitutes an article of diet in the tripe-shops. The examination thereof is important. Each quarter should be criticised in respect of volume and consistence, and an incision should be made from the ampulla right through the whole gland, dividing it into halves. The milk ducts and gland tissue will then be well exposed, and its peripheral borders and ducts should be carefully examined.

The Lymphatic Glands of the Udder.—Situated at the supra-posterior border of each gland, near the entrance of the blood-vessels—that is to say, above the attachment of the hind quarters. Their examination is extremely important in all inflammatory diseases, tuberculosis, and septic affections of the udder.

Pharyngeal Glands.—Situated at each side of the pharynx, and related to the inner surface of the great cornu of the hyoid bone near its attachment to the skull. They are easily got at by placing the head on a table, face downwards, with its base towards you, the examiner raising the cut end of the trachea with the left hand, feeling for the hyoid bone, and make an incision. They are frequently seen without any dissection when the tongue is removed.

Submaxillary Glands.—Found at the angle of the lower jaw, at the inner side of the attachment of the sterno-maxillaris.

Parotid Glands.—At the anterior border of the parotic salivary gland, resting on the masseter muscle.

Sub-occipital Glands.—At the base of the occipital bone, near the condyles.

Mammary or Superficial Inguinal.—These have been already alluded to. In the bullock they are to be found at the base of a mass of fat known as the "cod" in the inguinal region, and are readily brought into view by making a bold incision in this fat from the inner surface and cutting down upon the abdominal tunic. In the pig these glands are to be found in the subcutaneous fat above and a little posterior to the last teat in the inguinal region.

Deep Inguinal Glands.—This large group of glands is to be found at the pelvic inlet, in the distal edge of the loin suet, and on the course of the external iliac artery about midway between its departure from the aorta and its entrance into the thigh muscles.

Iliac Glands (*External and Internal*).—These are related to the arteries of the same name at their origin about the last lumbar vertebra.

Sacral Glands.—Situated at the floor of the sacrum, between the two internal iliac vessels.

Lumbar Glands.—These may be described as a superficial and deep set. The superficial chain, which perhaps belong to the large bowels of the mesentery, are to be found in the fat in front of the large vessels in this region. The deeper set are situated close on to the lumbar vertebra.

Another group of glands is to be found in the fat of the loin, resting on the muscles of the flank a few inches anterior to the deep inguinal, and at the point where the circumflex iliac artery divides into its anterior and posterior branches.

Renal Glands.—At the origin of the renal artery, about the second lumbar vertebra.

Cœliac Glands.—Between the pillars of the diaphragm, at the origin of the cœliac axis.

Popliteal Glands.—These glands are to be found in the popliteal space, and are readily got at by cutting through the thigh muscles immediately above and posterior to the stifle-joint (femoro-patella articulation), on the track of the femoro-popliteal artery.

Precrural Glands.—Of large size, and found in the groin fascia. The landmarks for its section are the superior border of the panniculus carnosus, a few inches from its posterior angle at the groin, and the fascia intervening between this point and the anterior muscles of the thigh.

Subdorsal Glands.—These will be found on each side of the aorta, from about the fifth to the last dorsal vertebræ. Most of these glands are frequently removed in dressing, but two or three will be generally found from the tenth to the thirteenth vertebræ.

Intercostal Glands.—Situated between the ribs at their junction with the vertebræ. In health they are very small, probably not larger than a pea. In disease, however, they may be the size of a hazel nut.

Suprasternal Glands.—Situated between the costal cartilages of the first six ribs, under the triangularis sterni, on the course of the thoracic artery. In front of the thoracic side of the insertion of the diaphragm, across the ensiform cartilage, will be found a gland superficially placed.

Prepectoral Glands.—This large group of glands will be found at the entrance of the chest, on the surface of the first rib, if not removed by the butcher. A deeper gland, however, will always be found in the fat immediately anterior to the first rib, and beneath the scalenus muscle, resting upon the posterior deep pectoral.

Brachial Glands.—These glands cannot be conveniently examined unless the fore quarter is divided longitudinally. They can, however, be exposed by removing a portion of the second rib, when they will be found in the fat beneath, resting on the teres major near its insertion into the humerus.

Prescapular Glands.—Found in the mass of fat immediately anterior to the shoulder joint, under the mastoido-humeralis muscle.

An examination of the lymphatic glands is extremely important in tracing the origin, course, and extent of disease ; consequently their normal size, consistency, and colour should always be taken into account. There are very few diseases or conditions which render the carcase of any animal unfit for human food but what produce some abnormal changes in these glands. This is evident when we remember that the lymph that circulates through these glands is simply diluted blood-plasma, which is constantly exuding from the blood capillaries into the interstices of the tissues of the body, from which the lymph vessels arise. Other matters than those on normal blood-plasma may find their way into the lymph-stream, such as the waste products resulting from the metabolism of tissue, a great part of which is purely excrementitious. It may also be mentioned that changes in the character of lymph correspond very closely with changes in the character of the blood.

The lymph glands have, therefore, a defensive as well as an elaboratory function to perform. And when overcharged with effete matters, as in all acute inflammatory and blood diseases, they become swollen, congested, or inflamed, or even broken up to the consistency of a rotten pear.

Changes in the lymphatic glands may be local or general according to the extent of disease in the system producing these changes, as are observed in tubercle, udder diseases, injuries, &c.

THE EXAMINATION OF THE CARCASE.

It not infrequently happens that the Meat Inspector has got to pronounce as to the fitness or otherwise of meat for human consumption simply upon the examination of the carcase, which is a very unsatisfactory situation. The consistency, colour, and odour of the flesh, together with the condition of the lymphatic glands, will in most cases, however, declare the existence of disease.

Before making a section, the following scheme might be observed :—

I. *Name animal.* II. *Sex.* III. *Age.* IV. *Nutrition.*

V. *Surface abnormalities, e.g.*, post-mortem lividity, hypostatic congestion, œdema, subcutaneous hæmorrhages, injuries, &c.

VI. *Condition of pleura and peritoneum.*
VII. *Indications of imperfect bleeding*, and the trickling of dark semi-coagulated blood, as in anthrax.
VIII. *Fat.*—Quantity, consistency, colour, &c.
IX. *Kidneys.*—It is generally convenient to examine these now. In the old cow they are frequently found diseased.
X. *Rigor Mortis.*—The quartering of a carcase, beyond dividing the vertebral column, should be deferred until it is set or *rigor mortis* is complete, more especially so if there is any chance of a portion of the carcase being passed.

Setting.—Rigor mortis or post-mortem rigidity is a contraction of the muscles producing a general stiffening of the body (carcase), and is due to the coagulation of myosin.

The process is said to be modified by—

(1.) State of animal before slaughter, *e.g.*, excited or calm.
(2.) Presence or absence of disease.
(3.) Temperature of surrounding atmosphere.
(4.) Humidity of surrounding atmosphere.
(5.) Method of slaughter.

In order to have sweet bright meat every facility should be given to favour the setting of carcases, and in obtaining this object it is necessary to consider the following as affecting decomposition :—

(*a*) The purity of atmosphere.
(*b*) The principles of evaporation.
(*c*) The reduction of temperature.

Atmosphere.—The necessity of a pure atmosphere is self-evident.

Evaporation.—The slow production of vapour from a moist surface.

This is necessary in order to dry, make marketable, and secure the keeping of meat.

The rapidity of this evaporation is influenced by—

(1) Temperature.
(2) The quantity of moisture in the surrounding atmosphere.
(3) The renewal of the atmosphere.
(4) The extent of surface of evaporation.

Increase of temperature accelerates the evaporation by increasing the elastic force of vapour. Secondly, no evaporation could take place in an atmosphere already saturated with vapour of the same liquid. Thirdly, as to the renewal of atmosphere, it is evident that if the air surrounding a liquid is not renewed it soon becomes saturated and evaporation ceases.

Reduction of Temperature.—This is effected by the conduction and radiation of heat.

By conduction is meant that heat is transmitted into a body by its gradual communication from one material particle to another until the temperature of the whole mass is raised, and by the same process the body becomes cold again.

Meat is a bad conductor of heat, that is to say, roughly, it admits heat with difficulty and gives it up with difficulty.

Radiation, or the emission of heat from a body, plays an important part in the reduction of temperature or the cooling of a carcase, at any rate

until an equilibrium is reached with the temperature of surrounding bodies. It is necessary, however, to watch that this surrounding temperature is favourable to the keeping of the meat. The practical purposes achieved by these considerations go to show that a natural phenomenon must not be interfered with, but rather that great care should be taken to assist its completion, and pursued to a point that will improve and help the economy of the meat trade, which is no small medium of exchange in this country. By way of further illustration, I may mention that in the heat of summer we occasionally find that decomposition is established in the centre of large hind-quarters of beef about the second day after being dressed. The explanation lies in the fault of cooling. Frozen hind-quarters of beef are sometimes found bad in their interior when taken out of the cold chamber. The fact can be explained in this way. The meat has been put into the freezing chamber in a warm state, evaporation and radiation from the surface has been checked, and a capsule of ice being produced in this way, a battle is fought between the imprisoned heat inside and the frost. The result is that before the heat is overcome fermentation has been established.

The necessity of a frequent change of air is also illustrated by the adoption of those refrigerators or ice-boxes used by butchers, confectioners, restaurants, hotelkeepers, &c.

Warm meat put into these closed-up boxes, although charged with ice, is frequently found bad in the Interior, owing to the cooling phenomena being delayed.

It may also be interesting to remark with regard to frozen or chilled meat that, after exposure, its surface soon becomes moist or wet, this being more marked in a humid atmosphere. This is due to the fact that the layer of air immediately in contact with the chilled body is cooled below its point of saturation, and therefore deposits a portion of the vapour it contains, just as when a bottle of cold water is brought into a warm room it becomes covered with moisture owing to the condensation of aqueous vapour upon it.

SECTIONING THE CARCASE IN THE CASE OF CATTLE.

This should be done as far as possible in a customary manner, as undue mutilation is undesirable should any portion of the carcase be passed. Different districts have slightly different methods, and the butcher can generally be allowed to divide in his own way, so long as it permits of the purposes of inspection.

In Manchester the fore and hind quarters are separated by commencing at the junction of the first and second lumbar vertebræ or the sixth joint from the sacrum. The muscular area exposed is not large, and only occasionally will it suffice for the investigator. The hind-quarter should next be cut by making a complete section through the muscles of the thigh, commencing about an inch or so from the ischio-pubic symphysis, sawing through the head of the thigh bone (femur), after which the knife is directed in a longitudinal manner through the muscles of the flank. This is a customary section in the trade, and it is the most satisfactory for the examiner, inasmuch as it exposes to view a large muscular area, and one which is frequently the seat of abnormalities.

The fore-quarter should be divided by a longitudinal incision down through the shoulder joint, in order to expose the thick muscles and the

joint cavity. After this section it is easy to expose the brachial and prescapular lymphatic glands.

The purpose for which these sections are made is to ascertain the colour. odour, and consistency of the flesh, evidences of medication and putrefaction, and any other morbid change, such as parturient injuries, inflammatory conditions, œdema, hæmorrhages, purpura eruptions, transudations, emphysema, parasites, and whether death was due to natural causes or slaughter.

With reference to inflammatory fluids in the flesh, I may mention that the increased transudation of liquids into the tissues is a feature of all inflammations. This infiltrated fluid causes the muscles to have a gummy consistency, in consequence of the albumen it contains, and it is thus easily distinguished from ordinary dropsical fluids.

The muscles, therefore, of an animal that has suffered from any acute inflammation will be found dark, owing to imperfect oxidation, and their normal texture destroyed by the infiltration of an albuminous fluid, which imparts a gummy sensation to the fingers. The lymphatic glands will also be congested.

Chemical tests and the frequent use of the microscope, it must be remembered, are valuable accessories in solving the problems of disease.

DISCUSSION.

Mr. HUGHES, in thanking Mr. Holburn for his instructive paper, confessed to having learnt more about lymphatic glands than he had done before. The importance of an acquaintance with them would be recognised by all. Meat inspection was, no doubt, becoming the question of the day, and veterinarians ought to hold their place as being experts in it. They would readily recognise that trained veterinary surgeons, who were most acquainted with the diseases of animals, were in the best position to judge of the wholesomeness or unwholesomeness of the meat. As to the despatching of animals, nothing was, in his opinion, more effective than a good revolver. Country practitioners in his district, when called upon to assist the medical officer of health, very often had not the opportunity of inspecting the internal organs, consequently they were at a disadvantage in arriving at a right diagnosis. Often they had to judge from external appearances of the carcase; and the question arose as to the influences which render the external appearances of value. For example, the yellow appearance of the carcase, it was well known that the food of the animal had an important influence upon it. He presumed the fat of an ox fed with oil-cake and cotton-cake would be yellower than that of one fed with milk and roots. Again, the fat of sheep fed with oil-cake and cotton-cake would be yellow, and it was important to bear in mind that the yellow appearance of the fat of an animal was also produced by "flukes" or anything which interfered with the function of the liver. The manner of bleeding had a marked effect on the appearance of a carcase.

Mr. WOLSTENHOLME expressed the pleasure with which he had listened to the paper. He thought that it emphasised the necessity which existed for the employment of veterinary surgeons as inspectors of meat and milk. Any sanitary officer could determine whether meat was putrid or otherwise, but only a veterinary surgeon, with his knowledge of anatomy and the conditions of organs and parts in health as well as disease, could give a reliable and adequate opinion.

Indeed, this was not stating the case as fully as necessary, for much more than a naked eye examination was often essential. To this end the addition of a small laboratory was required, with autoclure and ovens for the cultivation of micro-organisms, and with a centrifugal machine for the treatment of milk, &c., prior to examination for tubercle bacilli and other organisms.

Not only was a professional man demanded, but one well up in the latest training in chemical, bacteriological, and microscopical science. He thanked the lecturer for his excellent paper.

Mr. LLOYD congratulated Mr. Holburn upon his effective paper and excellent photographs. Though the essayist had gone thoroughly into meat inspection from a theoretical point of view, he had not mentioned anything about practical abattoir work as regarded the different diseases of animals met with, viz., strangulation, milk fever, foot-and-mouth disease, anthrax, &c. Those were aspects over the different carcases to prove to a skilled inspector what was the cause of death. As a meat inspector he had often got only the carcase, and not the offal, thus making it difficult to come to a correct diagnosis. All would be agreed as to the veterinarian being, or should be, the most competent meat inspector; but, as Mr. Wolstenholme said, there was no doubt that a practical training after the theoretical training was necessary to make a good meat inspector. In the last Royal Commission on Tuberculosis it was very clearly brought out that meat inspection was very essential, and it was recommended that all meat inspectors, before being considered competent, should be forced to pass an examination, but the Local Government Board had not seen fit to do that.

Respecting public abattoirs, he considered that they should be in every large town, and, if possible, in some of the villages. The question, however, arose as to compensation for compelling butchers who had their own slaughter-houses to close them and patronise the public abattoir.

Mr. FAULKNER, after thanking Mr. Holburn for his able paper on such an important and extensive subject, emphasised the fact that if the public were to have efficient meat inspection it must be performed by veterinarians, who possessed the necessary qualifications for such work. There was, he thought, a good deal in Mr. Lloyd's remarks about the practical aspect of meat inspection.

Mr. HOLBURN, in reply, pointed out that his paper was on some introductory remarks on meat inspection. It would be impossible in one evening to have entered fully into all the points raised by Mr. Lloyd. With regard to animals being killed or paralysed by lightning, he did not think electricity would necessitate the condemnation of the carcases.

As to black-quarter, this was a peculiar disease; it was not a disease of man, but a microbic disease, and the bacilli lived only in the affected part —they were not even in the blood—so that naturally one would think that by removing the injured portion the flesh would be safe. The other thing counteracting that was ptomaine poisoning. Practical experience showed that it had not been traced that any direct death had resulted from eating the flesh of any animal affected with black-quarter. With reference to slaughter-houses, they all knew the importance of public abattoirs, and would like to do away with private slaughter-houses. In the matter of carcases coming in dressed with no internal organs, it would be a good thing if such carcases were admitted with a certificate from a veterinary surgeon in the country.

Replying to Mr. Hent's inquiry as to the effect of medicines on the flesh, volatile medicines, turps, &c., did impart an odour to the flesh, and in those instances it would be justifiable to condemn the carcase, which would be uneatable. Many other medicines, however, did not impart an odour to the flesh. When medicines were given disease was sufficiently extensive to warrant condemning the carcase.

Mr. S. LOCKE then proposed a hearty vote of thanks to Mr. Holburn for his most instructive paper.

Mr. HUGHES having seconded, the proposition was carried unanimously.

Mr. FAULKNER moved that the best thanks of the Association be tendered to the retiring officers for their services during the past twelve months, and to the President for the able manner in which he had conducted the affairs of the Society.

Mr. TAYLOR seconded, and the motion was carried.

ON IMMUNITY.

DISCUSSION AT THE ROYAL MEDICAL AND CHIRURGICAL SOCIETY.

A MEETING of this Society was held on 12th March, Dr. F. W. Pavy, the President, being in the chair.

Professor SIMS WOODHEAD opened a discussion on the subject of Immunity. After referring to the magnitude of the subject, he remarked that though some observers might have modified their opinions during the past eight years as to the exact part played by Metchnikoff's phagocytes, all would agree that without his epoch-marking work it would have been impossible to discuss other theories with any degree of intelligence, for upon the phagocyte theory the "side-chain" theory of immunity and antitoxin production depended for its inception and conception. He mentioned that whilst in Edinburgh he and Dr. Cartwright Wood had carried out a series of experiments on the production of immunity by means of soluble products, in which they thought they obtained a condition in which special activities of the cell were drawn out, comparing the cell to a many-faced body, each facet of which was enabled to withstand the attacks of poisons or substances which they had been trained to resist. He referred to the theory of separable enzymes and external metabolism, to Bouchard's "antibodies" produced by all cells, and then spoke of Behring's more systematic observations on the action of toxins in producing antitoxins. Referring to the "overflowing" of antitoxins from the cells, he maintained that this was comparable to the overflowing of the toxins from the bodies of organisms. There were some properties or "functions" which appeared to be separable only with great difficulty from the bodies of micro-organisms, so also there might be certain properties or functions which were more intimately bound up in the protoplasm of the cell. In so far as these were distinct, he maintained that immunity was distinct from antitoxin production, but in so far as they were interchangeable and collateral, immunity and antitoxin production must run side by side. He referred to Bütschli's theory of the structure of protoplasm and the relation of metabolic products to the protoplasm, and pointed out that, if they accepted this theory, then immunity and anti-

toxin formation, though not the same, must in many cases be very nearly related. He then explained Ehrlich's idea that in regard to immunity the toxic action of a toxin was practically a matter of little importance, in so far as a toxin did not produce its antitoxin by virtue of its toxic power, but because on introduction into the animal body in such a way that its immediate destruction was avoided it was assimilated—*i.e.*, it entered into very close combination with the protoplasm of the cell, and as a result of this assimilation they had the production and overflow of antitoxic substances from the specially stimulated cell. But the production of immunity against disease appeared to be merely a part of a general process going on where albuminoid substances were being assimilated by living protoplasm. In this connection he referred to the late Dr. Walter Myers's experiments on Immunity against Proteids,[1] and indicated their importance in regard to the specific effects produced by proteid poisons in determining immunity and antitoxin production. The study of the ferments formed by pathogenetic organisms could perhaps be best advanced by continuing the study of the non-pathogenetic enzymes, hæmolytic substances and agglutinins, in connection with which Ehrlich, Pfeiffer, Gruber, Durham, and others had already obtained such brilliant results. Ehrlich had found that the toxic molecule could be so modified that, whilst losing a great part of its lethal activity, it still retained its minimising influence on the cells. Dr. Cartwright Wood had proved that it still retained its power of stimulating the cells to produce antitoxin, these observers having their work confirmed by Ritchie. The molecule able to become assimilated by the cell still retained its characteristic power of forming "antibodies." Bound up with the theories of immunity and the source of antitoxin was the question of the nature of antitoxin. One of the original theories put forward by Roux and Vaillard and afterwards emphasised by Ehrlich, that antitoxin was the result of the special stimulation of certain cells, received support from a very large number of observations made during the preparation of antitoxin in the fact that it was only where there was marked reaction, especially of a local character, that there was any increase in the amount of antitoxin produced. He laid special stress on the local reaction because the toxin injected must exert its greatest stimulating power—in fact, one might almost say its only stimulating power—on those tissues with which it came directly in contact, that was before it became mixed with any large quantity of lymph or found its way into the circulation, in which, at the temperature of the body, the combination of toxin and antitoxin went on with great rapidity, the amount of antitoxin in the blood of some of the animals under treatment being thousands, and even tens of thousands, of times the quantity required to neutralise the whole of the toxin injected. Acting locally, however, it might be readily understood how the toxin, given in gradually increasing quantities, could still continue to stimulate the connective tissue cells to the production, excretion, and overflowing of the antitoxin into the surrounding fluids. Behring drew attention to the fact that the tissues might become hypersensitive even when large amounts of antitoxin were present. Such a condition they would expect to find in the more highly organised tissues for which the toxin had a special affinity. Here there might be a kind of local hypersensitiveness induced through want of equilibrium due to over-stimulation. The amount of antitoxin might be great, quite sufficient to protect against

[1] *The Lancet*, July 14th, 1900, p. 98 *et seq.*

toxins introduced in the ordinary way, but inadequate, because it could not act at one place at once, to counteract the local action of poison specially introduced in bulk and at one point. As regarded the amount of antitoxin produced, he might mention that, taking the lethal activity of a toxin to represent its quantity and neutralising power, he had records of the formation of 20,000, and even 40,000 times as much antitoxin as he used toxin. This was remarkable, and indicated one of two things: (1) Most probably that the immunising or antitoxin stimulating substance was of the nature of a toxoid or of a proteid molecule that was not highly toxic, and (2) that the process of antitoxin formation went on long after the special and specific stimulus had been removed. The idea that antitoxin was merely a modified toxin was strongly dissented from. In support of this he would put forward the above facts and also the observations made by Martin and Wood as to the nature of albumoses. He himself had found that these albumoses, whatever might be their exact character, were not specially toxic, but, on the other hand, they were in no sense of the term antitoxic. They had the power when introduced into the body of setting up the formation of antitoxin and also the power of producing a very definite immunity. They had also evidence of the cellular origin of antitoxin in the way in which it continued for long periods in the fluids of the animals in which it was produced, long after all trace of toxin had disappeared, although it might be, and was, thrown out as a foreign body from animals into which it was ingested. The discovery of the linking-on of toxin to proteid bodies, and particularly to special proteid bodies, and the assimilation by cells, with the consequent appearance of antibodies, was one of the most remarkable contributions to their knowledge of immunity that had yet been made. He then dealt with the question of polyvalent sera, and pointed out how important were Durham's observations in connection with the subject of relapses. Whether they were justified in accepting this theory of specific reaction or that put forward by Dr. Cartwright Wood, they were gradually working out the extreme specificity of immunity in most cases of disease. A general insusceptibility there was in many cases, but this could usually be increased at the expense of a marked protection against specific bacteria and bacterial poisons. He should leave the specific immunities to be discussed by those who would follow and who had paid special attention to specific diseases.

Professor A. E. WRIGHT did not think with Professor Woodhead that the theories of immunity which were propounded by Metchnikoff and Ehrlich respectively could be regarded as theories which merged into each other. Metchnikoff's phagocytosis theory was designed to explain the bactericidal effects observed in the organism. An explanation was found for these in the assumption that the organism of the higher animals corresponded to a colonial aggregation of monocellular organisms, some of which in the form of white blood corpuscles still possessed the properties and exercised the functions of the original free-living monocellular organisms. There was no doubt that the fact that white blood corpuscles emigrated towards the seat of a bacterial invasion, and that the bacteria were afterwards found in the interior of the white blood corpuscles and often in a condition of disintegration, was brought much nearer to the understanding by the theory propounded by Metchnikoff that the bacteria were incorporated and digested by phagocytes. On the other hand, when they turned from the

consideration of the inflammatory and bactericidal effects seen in the organism to the consideration of the problem of antitoxin formation in the organism, the theory of immunity propounded by Metchnikoff failed entirely to provide anything in the way of an acceptable explanation. Metchnikoff's view that the white blood corpuscles voided antitoxins into the body fluids under the stimulus of a toxin might, it was true, be crudely compared with the ex-voiding of mucus which took place when a snail was brought into contact with alcohol, the toxin of the yeast plant, but the mental picture would not explain to them the fact that a number of different specific antitoxins were produced in the organism in response to the introduction of a series of different toxins. This last, as distinguished from the problem of the bactericidal effects exerted by the organism, was the problem that Ehrlich set himself to solve. He asked himself not how it was that bacteria were destroyed in the body, but how it was that when a guinea-pig was injected with a poisonous element—and in some cases the poisons in question were poisons which were brought in contact with the responding guinea-pig for the first time in the history of the individual and the race—an antitoxin was produced whose chemical properties fitted those of the poison as accurately as a key fits into its corresponding lock. Professor Ehrlich had drawn attention to the fact that such antitoxin production took place only when the poisons which were injected were albuminous substances or substances allied to them—when, in other words, the poisons were such as might, the speaker thought, be conveniently denoted as "poisonous food-stuffs." Such "poisonous food-stuffs" would be taken up into cells by virtue of the fact that there were in the cells molecular groups—side-chains—which possessed chemical affinities for the substances in question. Following upon this "occupation" of the side-chains by the poisonous food-stuffs, there would occur, in the opinion of Ehrlich, a re-formation of similar side-chains in the cell, which would gradually transform itself into a process of "internal secretion," the product of secretion being a substance identical in its chemical affinity with the toxin with the original "side-chain" constituent of the cellular protoplasm. The further question as to what kind of cells contained side-chains which could be thrown off as antitoxins had been somewhat incompletely treated by Ehrlich; for while he had emphasised the fact that the cells whose side-chains were affected by the toxin were those which responded with a formation of antitoxin, he had, through a certain want of preciseness in the setting forth of his theory, allowed it to be understood that the response took place only in the group of cells which the clinician recognised to be affected by the poison. Such would be the case only with "monotropic" poisons—*i.e.*, poisons which affected only one variety of cell. In the case of "polytropic" poisons—and a very large number of poisons must come under this category—the chief response—*i.e.*, the chief antitoxin production—might take place in tissues which the clinician could not discover to have been affected. Under this category would come the white blood corpuscles which when affected by the toxin would naturally be involved in the production of antitoxins. It was, in the opinion of the speaker, only in this respect, and even here only incompletely, that the theory of Metchnikoff conformed with Ehrlich's theory of the production of antitoxins. Professor Wright then passed to consider the possibility of applying the theory which Ehrlich had propounded to explain the introduction of antitoxin in the system, to the explanation of the production of bactericidal substances in the blood. A

comparison could be established between the two processes when it was considered that the constituents of the bacterial protoplasm were in many cases poisonous, and that these constituents passed into solution in the lymph when bacterial cultures were injected into the subcutaneous tissue. An analogy was thus immediately established between the injection of toxin and the injection of bacteria. Similarly an analogy emerged between the response in the form of an antitoxin formation which took place after the injection of a bacterial toxin and the response in the form of a production of anti-bacterial substance, which had in the case of cholera and typhoid fever been observed by the speaker to take place in the case of bacterial injections. According to these the essential difference between an anti-bacterial substance and an "antitoxin" (using the term in its ordinary sense) would be that the substance produced in the latter case had a chemical affinity for the substances contained in bacterial filtrate, while the substance found in the former case had an affinity for a substance which was a constituent of the bacterial protoplasm. When it was considered that all substances—not being food-stuffs—which had a chemical affinity for a component of the living protoplasm were by definition poisons for that protoplasm, the circumstance that an antitoxin to a constituent of the bacterial protoplasm was capable of functioning as a bacterial poison was easily explained. Taking his stand upon the identification of anti-bacterial substances with antitoxins (using the term in its widest sense), the speaker proceeded to point out that the phenomena which came under observation after an injection of toxin came under observation also after an injection of bacteria. Just as in the first case the injected toxin circulated for a time in the blood of the injected animal, so after the injection of bacteria a similar negative phase probably occurred. It occurred, so far as the speaker's observations had gone, in the blood after an anti-typhoid inoculation, the negative phase being marked by a decline in the normal bactericidal power of the blood. Again, just as in the case of an animal which had been treated with an excess of toxin, the blood might—*e.g.*, in the case of animals injected with excessive doses of snake venom—contain toxic in lieu of antitoxic elements at the period when the blood was usually drawn off, so apparently in the case of an animal injected with an excess of a bacterial culture the blood might when drawn off contain substances which were not bactericidal but anti-bactericidal. Such substances were recently described by the speaker [1] as having been found in the specimens of "anti-typhoid sera" which were placed on the market for therapeutic use. Apart from an actual demonstration of the presence of such anti-bactericidal substances, the presence of such substances in "therapeutic sera" had been concluded by the speaker from the phenomena which he had observed in connection with a sample of anti-plague serum which had been prepared by Dr. Galeotti in Bombay, in the case of certain anti-streptococcic sera, and in the case of a sample of anti-Malta-fever serum prepared by him (Professor Wright). In the former case, where the effects of the anti-plague serum in question were studied by him in association with his colleagues of the Indian Plague Commission, the serum, though when given by itself it did not exert any noticeable toxic symptoms in guinea-pigs, it had the effect of hastening death in guinea-pigs who were at the same time inoculated with plague.

Dr. SIDNEY MARTIN could not agree with all that Professor Wright

[1] *The Lancet*, Jan. 12, 1901.

had said. The whole subject of the specific character of proteids was becoming cleared up. Some years ago it had been said that it was not possible for a proteid substance to be poisonous or to exert any toxic action upon the body. That was exploded now. There was no reason why albuminous substances should not exert a lethal influence on protoplasm, the composition of which was very delicate. Chemical affinity of proteid substances for cells had been brought out very clearly.

Dr. JAMES RITCHIE remarked that the recognition of the poisonous properties of albuminous substances displayed on protoplasm was no doubt important; but to his mind it was still more interesting to note that pathologists were more and more coming to the conclusion that all the fundamental pathological conceptions were biological. He paid a tribute to the late Dr. Walter Myers's work on immunity set up in animals against certain proteid poisons. This opened up a field for the differentiation of the many various kinds of albumin which might be alike in all respects excepting the way in which they reacted to a particular toxin. The want of proportion between the amount of a toxin introduced into an animal and the amount of antitoxin which resulted was a very remarkable fact which needed explanation. He had lately been trying the effects of immunising animals by successive doses of the same size instead of increasing doses. There was an enormous rise in the immunity with each dose, Among the many questions which still remained unsolved was this, Why should the immunity once produced be increased? How was it that the second dose was not neutralised by the antitoxin developed from the first dose?

Mr. T. J. BOKENHAM wished to approach the subject from a clinico-pathological standpoint. How was it that patients were not poisoned by the bacteria met with in such enormous numbers in the intestinal canal? The liver had been suggested as a guard. He had made experiments to see if this applied to the bacillus coli. This bacillus was introduced in quantity, and they were not found in the blood in the further side of the liver. But the liver itself was found to be crowded with bacilli. It had been shown that both organic and inorganic poisons were excreted by the bile into the intestines, and thus prevented from directly entering the general circulation.

Mr. H. G. PLIMMER wished to draw attention to some of the absurd erroneous purposes and misuses to which antitoxins had been put of late, experimenting with them in different diseases, such as aneurysm. In Italy he had come across several cases of natural immunity to malaria. These persons had allowed themselves to be stung by anopheles which were full of the malaria parasite. There was not sufficient explanation of this natural immuuity. Any bacillus injected into an animal's veins would disappear in five or ten minutes. This applied to anthrax or any other organism.

Dr. W. HUNTER referred to the question of the cells which were concerned in the production of antitoxin. Were they the cells of the body as a whole, or were they certain specialised cells? Metchnikoff's theory was the one which he favoured, and this implied the action of a special kind of cells. In his (Dr. Hunter's) experiments on hæmolysis he had introduced some of the most powerful hæmolytic bodies into the circulation, but if the spleen had been previously excised they produced no hæmolytic symptoms or effects. This went to show that the phenomenon of

hæmolysis at any rate was dependent on the action of cells of a special kind, of a mesoblastic type, and found specially in the spleen.

Professor JOHN M'FADYEAN referred to the necessity for a definition of immunity. Texas fever was now very generally attributed to an animal parasite. Beasts born in a certain district were, it was true, immune, but microscopical examination showed that their blood harboured the offending parasite, and it would seem in a non-attenuated condition, for blood from these animals could produce the disease very severely when injected into a healthy animal. Some of the small ruminants seemed immune to cattle plague, but the blood of these also contained large quantities of the organism.

Professor SIMS WOODHEAD, in replying, remarked that the malaria parasite was found to be present in the blood of children who appeared to be in perfect health, and were immune. Immunity and antitoxin production appeared to go on side by side, but he agreed with Dr. Ritchie in believing that they were not identical.

(*The Lancet.*)

LOCOMOTOR ATAXIA[1]

BY J. J. VAHEY, M.R.C.V.S., CASTLEBAR.

MR. CHAIRMAN AND GENTLEMEN—My principal object in choosing for the subject of my paper to-night "Notes on a few Cases of Locomotor Ataxia" is that it may provide a subject-matter for an interesting and profitable discussion, and that some gentlemen present may be able to throw some light on a disease which, I believe, is not generally recognised in our patients, and which has received very little attention in veterinary literature.

In placing before you those few notes I am fully conscious of their many imperfections, and of the very incomplete form which my paper must take, for I could not afford to devote anything like sufficient time to its preparation. My great hope is, that as locomotor ataxia is not often seen in the horse, a record of four cases which I was fortunate enough to have under my charge may be of some interest to you.

Practically the only mention I can find of this disease is in a paper read by Professor Macqueen at a meeting of the Midland Counties Veterinary Medical Association in November last, and in the February number of *The Veterinarian* Professor Mettam gives some extracts from a paper written by Professor Hendrickx and M. Lienaux.

Professor Macqueen is reported to have said that "locomotor ataxia has been observed in young horses and occasionally in old animals, and it was believed to be due to *spinal myelitis* with *sclerosis*, occurring at the brachial and lumbar enlargement of the cord, and brought by infection from antecedent disease, as strangles, influenza, or pneumonia." Amongst the symptoms which he describes are "curious movements of the feet and lips, increased sensibility of the skin, and a tendency to sweating.

In the paper by Professor Hendrickx and M. Lineaux the condition is designated *disseminated myelitis* or *multiple myelitis*, and is defined as "an inflammation more or less acute, with simultaneous *sclerosis* of the posterior and lateral tracts of the white matter of the cord. The centres are discrete

[1] Read at a meeting of the Irish Central Veterinary Society on February 21st, 1901.

or diffuse, involving more particularly the posterior horns of the grey matter, and due to arteritis involving a division of the middle spinal artery." The principal symptoms described in this paper are "stiffness, the limbs being moved as if all of one piece, rocking of the hind quarters, which became so pronounced that the animal threatened to fall when trotted, unequal response to stimuli at different parts of the limbs, but in the advanced stages general sensibility and the reflexes were re-established, perhaps exalted."

My cases presented an extraordinary similarity to one another in the nature and character of the symptoms, and in the manner in which they were exhibited. For convenience I will divide them into two pairs; the first pair terminated fatally, the second resulted in the animals being restored to usefulness. Taken collectively they point to heredity as the probable predisposing cause, for the animals in the first pair of cases were out of the same mare but by different sires, while those in the other pair were brother and sister. One animal out of each pair was a two-year-old, the other a yearling. They all had been well cared for, receiving daily some oats and hay in addition to a run at grass, and at the time they first showed any signs of illness all were in good condition and appeared in perfect health.

The first case occurred in May of 1896, the subject being a promising thoroughbred yearling colt which had been purchased with his dam about nine months previously. I was not asked to see him until about a week after it was first observed that there was something wrong, and I was then sent for to treat him for what his owner supposed to be a strained back; but his attendant, a very careful man, was quite positive in stating that the colt could not have met with any accident which would be likely to result in an injury to the back, and for a long time the nature of the condition from which the colt suffered, and the significance of the symptoms which I observed, remained a complete mystery to me.

As the animal stood in his box he looked the picture of health, his appetite was good, natural functions normal, pulse, temperature, and respiration normal. Pressure along the spine and on the muscles on each side of it caused no signs of pain, and rectal exploration was rewarded with only a like negative result.

On having him walked out the action of the hind limbs struck me as being very peculiar, and different from anything I had before seen in supposed injury to the back. There was a peculiar irregularity and want of co-ordination in the movements of the hind limbs, rather than an inability or fear to move them. The foot was lifted slowly but deliberately, the hock flexed rather less than normal, the whole limb carried forward in a very stiff manner, and the foot put on the ground again with a degree of hesitation and uncertainty, and with very pronounced irregularity. At one step the stride would be too short, the next too long, another would be too short and too much under the middle line of the body, while perhaps at the very next step the foot would be placed too far out from the body. These uncertain and irregular movements, taking place in both hind limbs, caused a peculiar rocking, sinking, or swaying movement of the hips and quarters.

In time all those conditions became aggravated, whilst new symptoms were constantly making their appearance. The stiffness of the limbs became increased, until eventually they were moved as if all in one piece; knuckling at the fetlocks soon made its appearance, and was most notice-

able when the animal was "pulling up" after being trotted, and in the advanced stages this became so bad that the front of the fetlock very frequently came in contact with the ground, and at each time this occurred it seemed as if nothing could save the colt from falling.

After about two months the fore limbs showed unmistakeable signs of also having become affected, but never to such a marked degree as the hind ones. They were carried very stiffly, the knees being only slightly flexed, the toes were often struck against the ground, and knuckling at the fetlocks frequently took place. Swaying from side to side of the body and quarters at each step was now very remarkable. Up to about this time the acts of lying down and getting up were performed with only a comparatively small amount of difficulty. When first asked to get up the colt seemed not to understand what was wanted of him, but with a little gentle persuasion he jumped up at once, but always looked as if he did not know where to put his feet or what to do with them.

During the early stages of the disease the eyes appeared perfectly normal, the pupils dilated and contracted naturally, but towards the latter stages it became quite evident that something was seriously wrong with the sight. On opening the stable door the colt turned round as quickly as his disordered action would allow him, pricked his ears and looked with an anxious and half terrified expression at whoever was going into the stable. On approaching him he turned quickly away and ran against anything that came in his way, his heart-beat being quite audible at a distance of several yards. His attendant's voice seemed to have a very soothing effect, for when he spoke the colt stood still, and turned his head in the direction in which the voice came. On being led out, an operation which now had to be carried out with great care, the colt stood perfectly still the moment he got outside the door, raised his head and looked about in a vacant and surprised manner, apparently not recognising where he was or anything about him. The pupils remained widely dilated, light having no effect on them, and naturally this disordered vision intensified and rendered more distinct the peculiarities of the movements of the limbs.

These conditions were gradually and steadily going from bad to worse, and each day I could see an increase in the symptoms already present or the addition of something that I had not observed on my last visit. I do not think the colt now lay down at all, at least for about a month no person had seen him in a recumbent position, but at last he was found down one morning and unable to rise, and the friendly bullet put an end to his misery.

Up to the very end the appetite remained good, the natural functions were performed regularly, and the sphincters reacted naturally. Sensation did not seem at first to be materially altered, but as the condition progressed, and particularly in the latter stages, it became exalted.

I made a post-mortem examination, but I regret to say that I learnt nothing from it. The instruments at my command consisted of a hatchet and a knife, and with these I only succeeded in breaking up the spinal cord to such an extent that it became impossible to even recognise what was healthy from what was diseased. I now regret my impatience in not waiting for a more favourable opportunity, for a knowledge of the lesions which gave rise to such a peculiar train of symptoms would be interesting and instructive, and as I did not afterwards have an opportunity of making a post-mortem on the second case, which terminated fatally, I feel my want of patience in the first instance all the more keenly

Case II.—The second case occurred in the early summer of 1898, the affected animal being a two-year-old thoroughbred filly, and half-sister to the colt referred to in the case I have described. These two cases were exactly alike in every respect, so that a description of the symptoms shown by the two-year-old filly would only be a repetition of those I have related. The course and termination and the treatment, or rather attempts at treatment, were also the same. To my very great regret this filly was destroyed while I was away from home for a few days, and I was thereby deprived of the opportunity of making a post-mortem.

The treatment which I adopted in those two cases was as follows. The animal was placed in a large, comfortable box, and bedded with peat. Feeding consisted of hay, oats, green grass, bran mashes, &c. At first I applied hot rugs, covered with waterproof, to the loins, hips, and quarters, and had the muscles of those parts freely and frequently massaged. I afterwards applied several blisters on the loins and back.

The medicinal agents which I employed comprised arsenic, potassium iodide, extract of belladonna, nux vomica, and although those agents had been given for a very long time none of them produced the smallest beneficial effect. The animal went from bad to worse until eventually it became necessary to destroy them.

My next two cases differ from the preceding two only in the fact that they terminated in the restoration of the animals to perfect health, and that the symptoms never reached such an aggravated stage as those observed in the two fatal cases. But the early symptoms were identical, there was the same want of co-ordination of movement. The limbs were carried in the same stiff manner, and there was the peculiar swaying or rolling of the quarters, and knuckling at the fetlocks was very pronounced, particularly in one animal.

Case III.—The first of these occurred in the early part of June 1899, the affected animal being a two-year-old half-bred filly. From the time she was weaned until the month of March 1899 she was kept on the same farm as the two thoroughbreds I have just referred to, and received the same feeding and attention.

When she first became affected her owner was inclined to think that she had fallen into a sand-pit and received some injury to her back, but the gradual way in which the symptoms first showed themselves and the steady manner in which they increased, both in severity and in variety, soon removed all doubt about the matter. There was no material difference between them and the symptoms observed in the early stages of either of the fatal cases. Standing in the stable she appeared perfectly well, the temperature and respiration were normal, the eyes appeared perfectly healthy, but the heart was somewhat irritable and on the least excitement beat very rapidly. All the natural functions were normal, and the sphincters reacted throughout the whole course of the disease. On being asked to walk or jog this filly showed a disinclination to move, she seemed not to know which leg to use first, but this hesitation only lasted for a couple of seconds. When she did move she took a couple of very long steps with the hind legs, flexed her hocks very little, and carried the limbs as if there was only one small joint in each, and that at the hock. Rolling of the quarters was very pronounced, as was also knuckling at the fetlock. I think this animal knuckled more than any one of the other three. At first sensation did not appear to be altered, but after a month it

became decidedly increased. The fore limbs only showed some stiffness and loss of flexion, but there was never any decided knuckling.

Case IV.—The fourth case took place in July of the present year in a yearling colt, and full brother to the filly just mentioned, and I happened to be the first to notice that there was something wrong. The owner and myself were looking at his young horses, this colt amongst them. While they were trotting about us something in the action of the hind limbs of this colt caught my attention. I thought he was carrying his hind limbs stiffly, and he certainly knuckled slightly. On communicating my suspicions to the owner, we had him brought into the yard, and a very slight examination was sufficient to change my suspicions into a certainty. When away from the excitement of his companions the colt showed the peculiar stiff, uncertain, and irregular action of the hind limbs, the peculiar rolling of the quarters, knuckling of the fetlocks, and catching the toes in the ground. When standing quiet in his box he occasionally showed some signs of uneasiness, he kept shifting about on his hind legs, occasionally would lift one or other of them, keep it elevated for a few seconds, and then put it cautiously down again. This continued off and on for about a fortnight, and I take it to be an indication of the muscular pains which human patients complain of in this affection.

Beyond those symptoms of interference with locomotion this colt showed no other signs of illness, his pulse and temperature were normal, natural functions normal, sight appeared perfect, and the pupils contracted and dilated naturally.

The treatment carried out in those two cases, and which I am glad to say was successful, consisted in good feeding and careful nursing, the application of blisters to the spine and loins, and the daily administration of strychnine by hypodermic injection, and iodide of potassium in the drinking water.

In the case of the filly, this treatment was carried out for three months, the doses of strychnine being gradually increased, and every now and then a week is allowed to elapse during which none is given. At the end of this time very little signs of interference with locomotion remained, and time removed those, and the filly was sold last month at a remunerative price.

The colt is undergoing the same course of treatment, and has already made very satisfactory steps towards recovery, and I have no doubt that in another month or two he will be restored to perfect health.

Before concluding, I might state that I did not try the effect of making the animal move with its eyes blindfolded, but I believe that in the human subject this test is very much resorted to, and has the effect of aggravating all the symptoms of disordered locomotion.

Clinical Papers.

CYSTOTOMY (LITHOTOMY).

BY A. CHINNIAH, COLOMBO, CEYLON.

History.—A black water gelding pony, about 14.2 high, eight years old, the property of W. W. Kenny, Esq., of Colombo, was brought to my surgery, with the history that the animal passes highly blood-coloured urine. It was treated by me for some time with palliative drugs, as in the case of ordinary hæmaturia; but when the case assumed an obstinate

nature, I suspected that there must be some mechanical agent—such as a calculus—doing the mischief, as the symptoms suggested. The animal was examined per rectum, and the presence of the calculus was diagnosed with certainty.

Symptoms.—There was painful straining during micturation, but at times the urine passed was of normal colour and consistency. After brisk exercise, the urine passed contained blood corpuscles and pigments in abundance, and the expression of the patient during the passing of urine indicated great pain. The appetite was all throughout good, and there was no noticeable rise in temperature. As soon as the proper diagnosis was arrived at I informed the owner that the animal must stand an operation, which, if it succeeded, was the only means of saving the animal.

Modus Operandi.—The instruments taken for the operation were: Scalpels, sharp-pointed bistoury, Syme's artery forceps, bull-dog forceps, stone forceps, Gullion's lithotriton, male catheter, and the female washing catheter.

The animal was thrown on the near side and general anæsthesia (chloroform) was administered. The penis was pulled out, washed and lubricated, and the catheter was passed, and the penis retained all throughout in this position by an assistant told off for the work. The off hind leg was drawn a bit in front. I took my position just near the croup. The tail was washed antiseptically, and given in charge of another assistant, to be kept in the desired position. An incision was made two inches below the rectum along the middle line of the perineum downwards.

When the urethra was reached, the sharp point of the bistoury was introduced into the tube (urethra), which was eventually slit open to admit the passage of the forceps. When the forceps were in the bladder, the stone was grasped, with the assistance of my left arm, in the rectum. Several attempts were now made to remove the stone without performing cystotomy or lithotrity, but they proved futile.

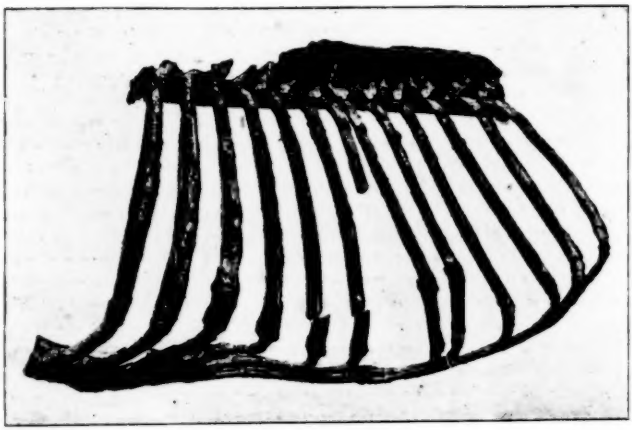
Though the lithotritor was at hand, ready for use, I preferred to perform cystotomy. The bistoury was passed along the urethra into the mouth of the bladder and guided by my left hand per rectum to prevent any rectal fistula, an incision was made dividing the mouth of the bladder, prostate glands, and (unavoidably) the pudic artery. The latter was promptly caught and ligatured. This made the operation simple, and, with the help of the hand per rectum, the removal of the calculus was easy enough.

The calculus weighs $3\frac{3}{8}$ ounces, and circumference $7\frac{1}{4}$ inches. It is not spherical, but convex on both surfaces, and the margin unbroken and round. The outer layer is apparently composed of phosphate of lime and the inner of oxalate of lime.

After Treatment.—The bladder was washed with a tepid solution of boracic acid. The wound was antiseptically treated and painted with iodoform and eucalyptus oil, and left open. The animal micturated soon after the operation, and passed urine both through the wound and along the natural passage. The passage through the wound ceased after the first day of the operation, 27th January 1901. The wound is being daily dressed antiseptically with what I call an antiseptic emulsion composed of boracic acid, carbolic acid, iodoform, eucalyptus oil, and glycerine, and satisfactory progress continues to be made. The wound is two inches in length and a quarter inch deep.

CALCULUS REMOVED BY VETERINARY-SURGEON CHINNIAH

(See pages 231-232.)



FRACTURE OF EIGHT RIBS.

(See page 233.)

FRACTURE OF EIGHT RIBS.

BY HENRY TAYLOR, M.R.C.V.S., NEW VETERINARY COLLEGE.

THE subject was a heavy Clydesdale gelding belonging to a large firm of carting agents, and he was admitted to the College infirmary on December 2nd, 1900, suffering from an open fetlock joint in the off fore limb.

He was placed in slings, and the necessary treatment adopted. There was great pain in the affected limb, so that the animal was unable to place much weight upon it. Treatment availed little or nothing, and, after being kept in slings for eight weeks, it was seen that if he did eventually recover, the result would be an anchylosed fetlock. In consequence, it was decided to destroy him, and this was done by pole-axing on January 31st, 1901, the animal falling on his off side. The slaughterman, on dissecting the carcase, found several ribs had been broken, and brought in for our inspection the ribs, &c., which are depicted in the accompanying photograph.

This came upon us rather in the nature of a surprise, for the fractures had never been suspected, much less diagnosed, during life. On making inquiries as to the patient's previous history, nothing was elicited as to the cause. He had worked regularly for five years, having practically never missed a day through illness.

The photograph shows fairly well the fractures on the 7th, 8th, 9th, 10th, 11th, 13th, and 14th ribs (part of the 12th is missing). Some attempt at repair had been made with all the fractures, but the ones where the reparative process was furthest advanced were the 7th and 8th ribs, probably because the inspiratory movements did not influence them so much as the others. The fractured ends of the 10th rib had been rubbing together, and were worn smooth. The union between the 7th and 8th ribs was not firm, the callus being simply the provisional one.

A case recorded by Mr. Rogers in the *Veterinarian* in 1894 may perhaps show some indication as to the length of time these fractures had existed. In this case a fractured first rib, after the animal had been kept in slings for three weeks and three days, showed that "only a small provisional callus had formed, and the broken and overlapped pieces of bone were freely moveable."

It is, therefore, probable that the multiple fractures in question occurred some time whilst the animal was in slings. Moreover, he used occasionally to throw his whole weight into them.

It is not an uncommon thing to find several ribs fractured in osteoporosis, but there was no appearance of any bone disease in this case.

For the photograph I am indebted to Mr. Lindsay, Class C.

Extracts.

THE DANGERS OF NEUROTOMY.

M. DAGES, in a communication to the Société Centrale, states that the operation of neurotomy, high or low, single or double, may be performed generally without fear of immediate accident. But this is not the case when the foot, rendered insensible by neurotomy, is the seat of or is subsequently invaded by a wound-lesion. In such circumstances neurotomy

may bring about gangrene (sphacelus) of the foot. M. Nocard states that accidents following on cutting of the nerve are quite exceptional, and that, in any case, they are not the necessary consequence of the suppression of the nervous flow into the hoof. He adds, however, that, the foot having become insensible, inflammatory lesions of the subungular tissues do not produce lameness; the attention of the owner is therefore not called to the danger till it is too late, and the hoof, becoming unfastened over a great part of its surface by the pus which has formed, drops off at the slightest shock. M. Nocard is also convinced that in cutting the nerve it very often happens that a subsidiary vein is injured. If the operation is not performed under rigorous aseptic and antiseptic conditions, phlebitis may be developed, and may spread to the vast podophyllous venous network, and cause suppuration over a very wide surface of the sub-keraphyllous tissues. To avoid such accidents it is necessary—(1) to operate aseptically; (2) to avoid as far as possible injuring or even exposure of the venous ramifications of the region; (3) to leave the animal in complete repose for at least one month after the operation.

(*Académie des Sciences de Paris.*)

As a pendant to the above we may give in outline a report sent to the Société by the veterinary surgeon of the 28th Dragoons, who states that he performed neurotomy (high and double) on a mare showing navicular disease. He took all antiseptic precautions, and did not touch the subsidiary veins. The wound closed by first intention, and after the operation the animal had never gone faster than a walking pace. Thirty-five days after the operation she began to limp seriously on the neurotomised limb. There was no trace of gathered nail, pricking, or injury from shoeing, but blood, mingled with pus, began to issue from various parts of the coronet, and a few days later the hoof dropped entirely off. Autopsy showed that all the extremity of the foot was gangrened. The writer thinks that the severity and rapid progress of the lesions can be explained only by the assumption of some deep-seated trouble in connection with the nutrition of the foot.

(*Ibidem.*)

THE DANGERS OF ELECTRICITY.

M. Mouquet read before the Société Centrale a paper describing the post-mortem examination of a horse which had been killed by the electric current on a tramway line. On this tramway there was a continuous current of a force of 500 volts and an intensity of 100 ampères. The horse (a dray horse) had placed a foot (probably a fore-foot) on a block, giving abnormally passage to the current, fell, and remained in contact with the block for some five or six minutes, and was then found to be dead. The post-mortem took place the next day.

The carcase was enormously blown up, and it may be stated in passing that cadaveric decomposition was further advanced than is usually observed on a dead animal which has succumbed to any injury in the same conditions of health, of external temperature, and of lapse of time. The skin for the space of a hand-breadth was the seat of a burn situated behind the ribs to the right, a little lower than the trace given by a horizontal plane

dividing the trunk into two portions as nearly as possible equal. On the level of this burn, which indicated the point of contact with the block as the animal lay, the hair was singed and scorched, and had partly disappeared; the derma on section was found to be red and gorged with blood; the subjacent conjunctive tissue was equally so, but over a surface of only half the extent. The blood which escaped on opening the corpse was black, not coagulated, and not reddening on exposure to the air. The whole intestines were congested. The congestion presented peculiar characteristics—characteristics which were afterwards found in all the blood-gorged organs, but which were more clearly visible and easier to analyse in the intestines, whose colour being lighter, stood out against that of the blood-gorged vessels. Taking the small intestine as a type for description, M. Mouquet stated that the vessels which, starting from the small curvature, go on ramifying and cut more or less obliquely the great axis of the organ, were so dilated that they seemed at a distance of a few yards like great branches almost black at their base and dark red at the top. But these branches (arborisations) differed from those generally seen in the fact that, instead of separating into smaller and smaller branches, as in a tree, they preserved a distinctly equal diameter throughout and even expanded at their extremities. They reminded one, in fact, of certain kinds of sea-weed found on our beaches or of the tracery formed by hoar-frost on our windows. On looking more closely at these lesions, it was seen that they resulted from an imbibition by the blood of the tissues adjacent to the vessels—an imbibition all the more accentuated as the the said vessels had less thick and resisting walls. The blood, so to speak, seemed to have become extravasated and to have acted like a splash of ink on blotting-paper.

The intestinal mucosa had assumed a reddish tint, varying from pink to a light wine colour. The mucosa of the stomach presented numerous broad hæmorrhagic foci. The liver was very black and very friable. The myocardium was sprinkled with hæmorrhagic infarcts. The endocardium and the valves in the two sides were of such a dark red colour that they gave one almost the impression of being black. The lungs were congested, but not seriously. The nerve-centres (cerebrum cerebellum, a fragment of the medulla) did not present any injuries visible to the naked eye. The corneæ were milky, but this condition might have come on after death.

To sum up, the electric current produced intense vascular dilations, specially marked in the intestinal organs and the heart. Having said this, and applying the usual data to the case of this horse, M. Mouquet felt justified in stating that the death of the animal had for its cause electrolytic phenomena, and this on account of prolonged contact with the block. In point of fact, the electric current, *whatever be its force*, kills in two ways: (*a*) by direct action (electrolytic effects), and (*b*) by reflex action (irritation of the nerve-centres producing effects called effects of imbibition). It may be added that high-power continuous currents are much more dangerous than alternating currents, for they produce death more easily on account of the electrolytic effects wrought in the tissues. Further, it may be stated that the horse is much more sensitive than many other animals to the various actions of electricity. Apart from this sensitiveness, it must be remembered that the animal's shoes expose it to great danger from contact, and that arises less from the iron of the shoe itself than from the nails which fasten the shoe to the

hoof. We may conclude that each nail forms a conductor whereby the current arrives at tissues which are in their turn better conductors than the dry horn of the periphery of the hoof.

In the discussion which followed the reading of this paper, M. Leblanc stated, in support of the thesis that horses are specially sensitive to electricity, that an inventive person whom he once knew thought he had discovered a secure means of subduing fractious horses, when they were being shod or yoked in carriages, by passing an electric current through their bits. He tried this once or twice on a horse with varying success, but one day the animal fell down suddenly as if struck with lightning, and never rose again. The experiment was never repeated. M. Leblanc, continuing, said he had seen when young an experiment tried with electricity on horses affected with atrophy of the muscles following on paralysis, but the effect was so startling—the whole apparatus being thrown to a distance—that the person making the experiment had to abandon it for the sake of his own safety. M. Leblanc said he had a horse which was so susceptible to electric influence that it became quite unmanageable as soon as it saw the plugs which form the ends of the wires of the electric pile brought near its spinal column.

M. Mollereau said he had frequently used electricity in cases of persistent paralysis of the femoral nerve following on an attack of paraplegia. Like others he had noticed the extreme susceptibility of horses to even feeble currents; he had noticed that horses which could undergo severe operations without wincing screamed and struggled with extreme violence when a current was passed through them. Still he thought it quite possible to utilise electricity in certain circumstances, as for example in reducing luxations of the patella dating back forty-eight hours, when all attempts had proved abortive which had for their aim to overcome the contractility of the crural muscles that keep the patella attached.

M. Sanson said that, as the result of many experiments with electricity carried on for a long time past, his opinion was that the organism of the horse is not peculiarly susceptible. Everything depends on the intensity of the current. On tramway lines enormous electric power is required, and this fact must be kept in mind.

M. Benjamin was of the opinion of the former speakers, and said he had been compelled to give up electric treatment in many cases in which he had formerly used it, even although he had used a very small apparatus.

M. Trasbot expressed the same opinion. He had frequently used electricity in the treatment of horses, and he had himself undergone electric treatment during a period of two months, and he considered that the horse was much more susceptible than man. He remembered the experiments made at Alfort by M. Bouley and himself with a view to overcoming paralysis in the horse. They used varied piles to produce continuous currents, and various instruments to produce interrupted currents, and these had been employed in treating cases of paralysis of the lips, which were very common, also of the penis, still commoner, and finally cases of paraplegia. In the former cases the animal was placed in shackles, and as soon as the current was applied it commenced to struggle violently, even when the currents were weak. M. Trasbot had never obtained any satisfactory therapeutic result from this treatment. In a case of paraplegia, one of the poles being applied to the loins and the other to the thigh or leg, actual convulsions were caused in the fore-part of the animal, and not

only did the electrisation of the animal not bring about a cure, but, on the contrary, hastened its death. M. Trasbot had long since given up electric treatment, but thought it possible that the future might reveal some mode of utilising this agent.

(*Recueil de Méd. Vét.*)

TREATMENT OF LAMENESS WITH SUBCUTANEOUS INJECTIONS OF ESSENCE OF TURPENTINE.

M. CAGNY, speaking on this subject before the Société Centrale, reminded the members that, two years before, he had told them of his experiments with turpentine in place of blistering and cauterisation in cases of lameness. He went on to say that he had followed the career of his patients and found that the cure had been complete and lasting. One of these patients, called "Three Kings," had been quite valueless before he tried injections along the flexor tendons of the fore-legs. This animal had been gradually restored to work, and was now the charger of a captain of dragoons. At the end of the autumn manœuvres of 1900, the officers prepared a photograph album with portraits of the nine best thorough-bred horses of the division. M. Cagny's patient was one of the nine. As a rule, M. Cagny's experiments were complete successes, but occasionally circumstances were against him, owners of horses being difficult to persuade as to the value of an unknown treatment and so on, but he had persevered, and was now able to speak from a varied and extensive experience. Injections made in the region of the shoulder he had found unsuccessful in curing horses suffering from coronary forms of lameness.

He cited the case of a thorough-bred horse called "William the Conqueror," which was bought by its owner for £400 when eighteen months old. It became lame at the beginning of its training. A veterinary surgeon put a seton in its breast, but one day the animal put its near fore-leg over the sword fixed to the halter and the breast-girth which was used as a means of retaining it. The lameness increased. After several fruitless attempts at training, resort was had to line-cautery on the two knees, but without success. The owner was on the point of ordering the horse to be destroyed, but decided to consult M. Cagny before doing so. He found that the animal walked lame, and that at the trot it was very lame, even on sandy ground. M. Cagny thought he recognised all the symptoms of lameness of the near shoulder, which was somewhat wasted. He proposed turpentine injections, and the result of these was so favourable that the colt, which had been lame for more than six months, was returned to the trainer. His plan of operations after treatment with the turpentine was the following:—The stable in which the horse lived was near a river where gad-flies and horse-flies abounded in the summer; consequently, in July and August blood-mares and colts could only be allowed to graze at night-time, say from seven or eight p.m. to three or four a.m. "William" was turned out, as soon as he was fit, at eight a.m. and four p.m. into a five-acre meadow for half-an-hour at a time and allowed to wander about. Stung by the gad-flies, he gave himself up to a "course of gymnastics," which was the very best thing for his development. After being trained, he ran a race when three years old, and won easily. But he could not run well except

on a straight course. Two months after the race, in May 1900, he had a return of his trouble under the following conditions:—On the training-track at Chantilly the turf had been worn away over a small surface, but instead of re-sowing it the authorities had brought pieces of turf from other places and laid them down there. A few days after this was done, a three-year-old, galloping along the course, stopped short there with the pastern of one of its fore-legs broken. The following day "William," when galloping, pulled up at the same place lame on his near fore-leg as before. He was brought back to the stable, and after a rest of fifteen days, the old treatment was applied with the same success. "William" ran at Chantilly in October 1900; he is a big horse, standing about 17 hands; the distance is 5 furlongs, and he was beaten by a neck, the victor being a small horse, which had for that reason a great advantage over his adversary on a short course. But "William" is no longer lame, and is still in the hands of the trainers.

M. Cagny mentioned another case, this time a dray-horse, so lame on the off fore-leg that he remained constantly lying. A seton had been tried, and he had been rubbed and blistered, but the lameness only increased, and in fact M. Cagny recommended his destruction, but the owner, who had heard of "William the Conqueror," begged him to give the animal a trial. He tried his turpentine treatment, and it was successful, the animal returning to his work.

M. Cagny went on to say that at the commencement of the training period—that is, from the age of twenty to thirty months—lameness is often noticed in race-horses, due apparently to lesions of the two shoulders. He thinks these are generally phenomena of growth, and that mere rest has an influence on their cure. He always uses injections, and finds that they always help to expedite the cure at least. He has had to deal with horses suffering from navicular disease of old date, for which periods of rest for two and three months brought no improvement. These animals, left in the loose-box, rose only for the purpose of eating; in three of them injections brought about an improvement, but this was only temporary. For six months they could be used, but after that the lameness returned as bad as before.

His mode of operation is as follows. Injections being always painful, especially in the case of nervous animals, it is important to put the animals on low but cooling diet for at least a fortnight beforehand. He uses rectified essence of turpentine, but in order to ensure asepsy and diminish pain, he adds to 10 grammes of essence about 1 gramme of a solution of gaiacol in alcohol at 96°, a solution of 10 per cent. About the middle of the shoulder he makes four injections of 1 gramme each, almost on a horizontal line, two in front of the edge of the scapula and two behind. He always makes the four injections on the two shoulders even for a lameness on the one side. The horse must then be left at liberty in the loose-box, with plenty of good litter. One must not be frightened at the symptoms which follow. Some horses seem affected with vertigo, and this may go on for several hours; others refuse to eat and drink for more than twenty-four hours. On the following day the shoulders are swollen, hot, and painful to the touch; the swelling increases and descends to the elbows, movement becomes difficult, and the horse remains motionless, but gradually the œdema descends and movement becomes less painful; it becomes once more very difficult for twenty-four hours when

the infiltration reaches the knees. There are two important points: leave the animals alone whatever the symptoms of vertigo may be, and don't try to calm them or walk them about, but let them have full liberty in a wide space well filled with straw. Afterwards, however severe the œdema may be and however great the difficulty of movement, don't try puncture or friction or fomentation, don't touch the shoulders, even if you think you notice fluctuation. About the fourth week the horse may be walked up and down or set at liberty for a few hours in a meadow. Gradually movement becomes easier, but the cure is not complete till two months have passed.

For strained tendons M. Cagny makes only two injections of 1 gramme below the knee, the one on the internal aspect, the other on the external, between the suspensory ligaments and the flexor tendons. As there are only two injections, the symptoms are less accentuated. But often through one of the injections there is a discharge of serous liquid resembling pus. In this case he recommends fomentations with a sponge and cresylated water. The cause is probably the greater density of the cellular tissue, but the subcutaneous infiltration persists for several months; it disappears only slowly and with graduated effort. Judging by the appearance of the region, we may believe that straining of the tendons is not cured when there is only subcutaneous infiltration.

(*Recueil de Méd. Vét.*)

THE SERUMTHERAPY OF MALIGNANT ŒDEMA.

LECLAINCHE and MOREL (*Ann. de l'Inst. Pasteur*, January 1901) have sought to produce a serum, preventive and curative, in regard to the bacillus of malignant œdema (*vibrion septique*). The normal serum of cattle possesses a certain power of neutralising cultures of the bacillus; the serum of the horse, ass, goat, and sheep has no such action. The ass was chosen for experiment. It was in the first instance inoculated with fluid obtained from infected muscle and serum intravenously; a serum was obtained capable of neutralising by admixture a lethal dose of virus, but incapable of protecting when inoculated twenty-four to forty-eight hours before the virus. The fluid was then used for a series of subcutaneous inoculations; the resulting serum was of greater power, and 5 to 10 c.cm. protected guinea-pigs from a lethal dose given twenty-four hours later. This serum, however, rapidly lost power when the local reaction to the virus diminished. Cultures of the bacillus in blood were then used, but it was found impossible by the intravenous inoculation of these to produce a serum of greater power than that resulting from the subcutaneous inoculations. Cultures in broth prepared according to the formula of Martin produced a much more active serum injected intravenously. It afforded protection for a period of five to six days against doses up to four times the normal lethal dose. Simultaneous injection of serum and virus was not followed by protection in the case of animals such as the guinea-pig, very susceptible to the virus; but the serum is capable of counteracting the virus if it is mixed with it before inoculation. The authors found that in this case there was a definite neutralising dose, and if the serum was used in quantity greater than this it proved less active. With regard to curative action, the serum was useless

in animals where the evolution of the septicæmia was very rapid ; in rabbits, however, it was capable of greatly retarding death, and the authors submit that in animals, such as man and the horse, in which the course of the disease is comparatively long, the curative action would be presumably greater. In rabbits success depended on the time elapsing between the injections of virus and serum ; it was not obtained when this was greater than two hours. Further experiments showed that the action of the serum was both bactericidal and antitoxic, and that the protection conferred was due to its action in stimulating phagocytosis.

INTESTINAL TROUBLES IN THE HORSE.

M. LANGINY reports some cases—(*a*) of rupture of the rectum as a complication of colic ; (*b*) of obstruction of the floating colon cured by intra-intestinal taxis handling ; (*c*) of intestinal obstruction cured by olive oil or poppy oil. M. Langiny has observed three cases of rupture as above. In the first case, on exploring the rectum of a mare which at the time of his visit was in that period of deceptive calm which precedes death, he found on the roof of the rectum a rent which would have allowed the passage of his fist. The animal had been raked a few hours previously by her owner, but M. Langiny did not attribute the rent to his action, but rather to the animal's falls on the ground, which had been frequent during her pains. In the second case, that of a mare more than twenty-five years old, he found her lying on her side struggling violently and making great expulsive efforts. On exploring the terminal portion of the rectum his hand found a rent in which a part of the small intestine was entangled. He attributed this to the same cause as the preceding. In the third case, that of a horse eighteen years old, he found on rectal exploration a veritable mass of hard fæces covered with bloody mucus ; the rectum was ruptured on its left lateral wall in an antero-posterior direction. M. Langiny thinks such ruptures are commoner than is supposed, and would be found frequently if horses succumbing to colic were carefully examined. His explanation is that the rectal walls become thinner with age, that there is probably a slight paresis of the organ, and the trouble is brought about by violent expulsive efforts and, in a special way, by falls on the ground. He thinks that horses ought to be prevented from lying down, and is greatly in favour of rubbing with essence of turpentine. M. Benjamin, commenting on this at a meeting of the Société Centrale, said that he considers turpentine quite unwarranted and even cruel for such cases ; he prefers camphorated alcohol, to which he adds a little essence of lavender ; he thinks that rupture of the rectum is certainly produced by expulsive efforts, and mentions a case which occurred during castration.

Going on to speak of obstruction of the floating colon, M. Langiny gives the case of a four-year-old horse in which, after careful examination, he thought he could diagnose intestinal indigestion. After puncturing the cæcum and making a hypodermic injection of eserine and pilocarpine, he was surprised to find that there was no evacuation. On making rectal examination he discovered that there existed in the colon, which was folded over, a pasty mass of some volume. He ordered half a litre (about a pint) of olive oil to be given to the patient, and went away. Next

morning, when exploring the rectum once more, he felt in the floating colon a mass of the volume of a billiard ball, which yielded to pressure. Gentle squeezing, followed by an injection of eserine, reduced the obstacle to the passage of alimentary matter, and the animal was cured. M. Langiny gives cases of intestinal obstruction cured by olive or poppy oil in large doses.

(*Recueil de Méd. Vét.*)

Reviews.

VETERINARY OPERATIONS. By PFEIFFER & WILLIAMS, with an Introduction by D. FRÖHNER. Baillière, Tindall, & Cox, London. 5s. net.

THIS small manual of eighty-four pages and forty-two figures should be in the library of all practitioners who are occasionally called upon to perform some of the more uncommon operations; and in fact those who have frequent opportunities of operating will be none the worse of a glance at the text and illustrations prior to operating, as a "refresher."

One advantage of this book is that it only gives one method of performing each operation, and so saves any confusion of thought in the mind of the practitioner, which might occur if several methods were suggested.

The illustrations are clear, and the directions for procedure are terse, lucid, and to the point.

We have much pleasure in strongly recommending this work to our readers.

"DOPES." By NATHANIEL GUBBINS. R. A. Everett & Co., London. One Shilling net.

THE administration of drugs to horses for dishonest purposes seems to have spread from America to this country, and we are in hearty sympathy with Nathaniel Gubbins in his efforts to put a stop to such a practice.

We have no doubt that if a charge of doing such a thing by a Veterinary Surgeon were brought before the Registration Committee of the Royal College of Veterinary Surgeons, that Committee would make it very clear that such conduct was "unprofessional," and liable to cause that Veterinary Surgeon considerable inconvenience.

At the same time it will cause a deal of trouble to differentiate between a "dope" and the honest administration of a stimulant to a cowardly horse, or a sedative to a nervous mare.

Far be it from us to in anyway assist the "doper" by pointing out the differences. It is only because we see so many difficulties in the detection and proof of "doping" that we even mention their presence.

In a letter we received recently from Mr. Fitzgerald, one of the leading professional starters in the United States (a Britisher every inch of him), he tells us that "doping" used to be common, but has been stopped in some parts owing to it having been declared illegal.

We notice in an American paper just to hand that a bill is now before the Legislative body of California to render "doping" a criminal act, with a maximum penalty of five years' imprisonment.

The book is full of interesting matter, contains a lot of valuable information, and is well worth reading.

ARMY VETERINARY DEPARTMENT.

The London Gazette.

WAR OFFICE, PALL MALL, *Feb.* 22.

Vet.-Capt. R. W. Raymond left for England on February 18 in S.S. "Simla," invalided home.

The transport "Canada" reached Southampton on Friday, March 1st, having on board Capt. E. W. Larnder, A.V.D., C.V.S.; S. Stockman, W. W. Brownlees, J. M. Lund, T. Rennie, and A. Leach.

MOOI RIVER, *March* 4.

Civil Veterinary Surgeon John Fras. Carless dangerously ill, tubercle lung.

WAR OFFICE, PALL MALL, *March* 8.

I.Y.—10th Batt.—Temporary Vet.-Lieut. H. C. Jagger resigns his commission.

March 12.

Vet.-Major Seaward Longhurst, F.R.C.V.S., retired pay, is granted the temporary rank of Vet.-Lieutenant-Colonel whilst District Veterinary Officer, Ireland.

C.V.S. H. Richards and A. G. Grist were discharged from hospital to duty for week ending March 3.

C.V.S. C. Jackson left for England in the "City of Vienna" on March 3.

C.V.S. J. F. Carless, out of danger, Mooi River, March 8.

Captain R. W. Raymond arrived at Plymouth in the "Simla" on March 12th, invalided home.

C.V.S. A. F. Jackson, C. H. H. Joliffe and Vet.-Surgeon J. de B. Griffith, Victorian Bushmen, were discharged from hospital to duty week ending March 10.

Obituary.

WE regret to announce the death of Mr. C. J. HEWLETT, senior partner of the well-known firm of chemists, C. J. Hewlett & Son, which took place on February 25th.

Mr. Hewlett was born at Bath on May 29th, 1810, and educated at Christ's Hospital. He was articled to a firm of wholesale druggists, and afterwards travelled for a short time for the same firm. In 1832 he commenced business on his own account, and in 1837, when the firm was Hewlett & Goddard, they published the first wholesale drug list. Previous to that it was customary to have a printed list of drugs and fill in the prices by hand. In 1857 Mr. Taylor took the place of Mr. Goddard, and the firm migrated as Hewlett & Taylor to Creechurch Lane, E.C., and on Mr. Taylor's death Mr. John C. Hewlett joined his father, and the firm became C. J. Hewlett & Son, which is its present title. Mr. Hewlett was the *doyen* of the wholesale drug trade, being in his ninety-first year. He was a pharmaceutical chemist, and member of the Pharmaceutical Society since 1842.

THE NATIONAL VETERINARY BENEVOLENT AND MUTUAL DEFENCE SOCIETY.

THE BENEVOLENT FUND—FINANCIAL STATEMENT, 31st DECEMBER 1900.

Dr. Mr. EDWIN FAULKNER, Honorary Treasurer, Knott Mill, Manchester, in account with the Fund. *Cr.*

RECEIPTS.

1900,		£	s.	d.
Jan. 1.	To Cash at Bankers,	299	18	1
Dec. 31.	,, Mersey Docks and Harbour Board, one year's Interest on Bond for £1300 at 4 per cent., less tax,	50	1	0
	,, Mersey Docks and Harbour Board, one year's Interest on Bond for £600 at 3½ per cent., less tax,	17	19	4
	,, Manchester Corporation Improvement Department, one year's Interest on Mortgage for £900 at 3 per cent., less tax,	25	17	6
	,, Corporation of Salford Gas Department, one year's Interest on Loan of £600, less tax,	16	18	3
	,, Bank Interest,	6	18	10
		£417	13	0

PAYMENTS.

1900,		£	s.	d.
Jan. 1.	By Balance due to Treasurer,	2	0	0
Dec. 31.	,, Grants and Donations:—			
	K. C. £8 0 0			
	A. L. G. 40 0 0			
	A. D. 2 0 0			
	M. H. 5 5 0			
		55	5	0
	,, Cheque Book,	0	1	8
	,, Cash at Bankers,	360	6	4
		£417	13	0

INVESTMENTS.

Mersey Docks and Harbour Board—3⅓ per cent. Bond No. 77,534, dated March 6th, 1883; repayable 27th March 1911,	£600 0 0
Mersey Docks and Harbour Board—3½ per cent. Bond No. 71,634, dated July 1st, 1900; repayable 1st July 1914,	1300 0 0
Manchester Corporation Improvement Department—3¼ per cent. Mortgage No. 1456, dated 15th November 1900; repayable 29th September 1903,	900 0 0
Salford Corporation—3 per cent. Mortgage No. 2233, renewed 21st December 1899; repayable 13th January 1903,	600 0 0

We have examined the above-written Account, and certify the same to be correct.

ALFRED H. POWNALL, F.C.A.
JNO. B. WOLSTENHOLME.

THE DEFENCE FUND—FINANCIAL STATEMENT, 31st DECEMBER 1900.

Dr. Mr. EDWIN FAULKNER, Honorary Treasurer, Knott Mill, Manchester, in account with the Fund. *Cr.*

RECEIPTS.

1900,		£	s.	d.
Jan. 1.	To Cash at Bankers,	696	5	7
Dec. 31.	,, Subscriptions received 1900, as per List,	137	0	6
	,, Bank Interest,	15	11	2
		£848	17	3

PAYMENTS.

1900,		£	s.	d.
Jan. 1.	By Balance due to Treasurer,	4	6	8
Dec. 31.	,, Hire of Room,	0	10	0
	,, Printing and Stationery,	7	2	1
	,, Solicitors' Costs,	40	0	4
	,, Accountancy Charges,	2	2	0
	,, Secretary's Postages and Expenses,	1	2	0
	,, Treasurer's Postages,	0	5	5
	,, Wreath—Principal Williams,	1	1	6
	,, Cash in hand,	0	12	6
	,, Balance at Bankers,	791	14	9
		£848	17	3

We have examined the above-written Account, and certify the same to be correct.

21st January 1901.

ALFRED H. POWNALL, F.C.A.
JNO. B. WOLSTENHOLME.

CONTAGIOUS DISEASES ANIMALS ACTS, 1864 AND 1890.

SUMMARY OF RETURNS OF OUTBREAKS for the Four Weeks ending 16th March 1901.

ENGLAND AND WALES.

Swine Fever.	Anthrax.	Foot and Mouth Disease.	Glanders (including Farcy).	Rabies.	Sheep-Scab (for month of February).
Outbreaks 212 Slaughtered 968	Outbreaks 37 Attacked 53	Outbreaks 4 Attacked 305	Outbreaks 86 Attacked 143	None.	Outbreaks 299

SCOTLAND.

Outbreaks 13 Slaughtered 135	Outbreaks 14 Attacked 18	None.	Outbreaks 0 Attacked 2	None.	Outbreaks 12

IRELAND.

Outbreaks 26 Slaughtered 330	None.	None.	Outbreaks 1 Attacked 1	Dogs Attacked 1 Other Animals 0 Slaughtered 0	Outbreaks 101

Communications, Books, Journals, &c., Received.

Agricultural Journal (Cape of Good Hope); Berliner Thierärztliche Wochenschrift; La Clinica Veterinaria (Milan); Deutsche Thierärztliche Wochenschrift; Tannoform in Veterinary Medicine (March); The Sanitary Journal; Scottish Medical and Surgical Journal; Veterinary Record; La Riforma Veterinaria; Le Mois Scientifique (Paris); L'Echo Vétérinaire (Liège); Annales de Médecine Vétérinaire (Brussels); Johns Hopkins Hospital Reports; Journal of Comparative Medicine and Veterinary Archives; Recueil de Médecine Vétérinaire; Gazette Médicale de Paris; Modern Medicine; Johns Hopkins Hospital Bulletin; Il Veterinario di Campagna (Moncalieri); Le Bulletin Vétérinaire (Orleans); Revista de Medicina Veterinaria (Bucarist); La Revista Veterinaria (Buenos Aires); Zeitschrift für Fleisch-und Milchhygiene (Berlin).